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Saturday Review World

GOLDEN ANNIVERSARY ISSUE

Part 2-
The Next 50 Years

August 24, 1974

2024 A.D.

A probe into the future by

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Polaroid's SX-70: The New Photography.

The Polaroid SX-70 Land camera atop a single section of the original electronic layout. Ultraminiaturization has compressed hundreds of electronic components into three small brain centers.

No matter how you've looked upon the act of taking pictures, instant or otherwise, picture-taking will never be the same.

A color photograph, which develops before your eyes outside the camera, is only the *beginning* of the SX-70 experience.

The rebirth of a sense of wonder and an increased awareness of the beauty that surrounds you are the end results of SX-70 picture-taking.

Watch it happen.

Remarkable as the Polaroid SX-70 Land camera is, what is important to remember is not what *it* can do, but what it enables *you* to do.

Touch the red electric shutter button and—whoosh—the picture is automatically ejected from the front of the camera.

There is nothing to time, nothing to peel, nothing to throw away.

Your picture begins developing immediately beneath a transparent, protective plastic cover. You can stack it with other pictures, handle it, put it in your pocket. You can even spill water on it and still not hinder development.

As the image blooms before your eyes, you realize that this will be a color photograph such as you have never seen before.

Even after you have a beautiful picture, it keeps getting better.

Minutes later, you're looking at your finished picture. It is hard, dry, shiny, flat and extremely durable.

The image size of the picture is 3⅛ x 3⅛ inches.

The camera that makes it possible.

The SX-70 Land camera, closed, is 1 x 4 x 7 inches. Wrapped in top-grain leather, it weighs only 24 ounces.

Inside, there exist over 200 transistors, a complex system of fixed and pivoting mirrors and a 12,000 r.p.m. motor, all working together to propel one brilliant picture after another into your life.

Yet all you have to do is frame, focus and touch the red electric button.

The SX-70 is a single lens reflex camera. Your eye sees precisely what the camera lens sees, because you're actually looking through the camera lens.

You can focus on a scene from miles away, down to 10.4 inches, and you can actually record far more detail than you can see without the use of a magnifying lens.

You can shoot up to 10 pictures, one every 1.5 seconds, to cover an action sequence, like a baby's first jaunt across the room. Or you can take automatic time exposures up to 14 seconds long.

The scope of SX-70 picture-taking is as wide as your imagination will allow it to be.

Power from the film pack.

As amazing as the Polaroid SX-70 Land camera is, the story of the other

Touch the button, your film is automatically ejected.

In seconds, you see the faint outline of your picture.

Your picture, minutes later, fully developed.

half of the system, the film, is equally magical.

Each 10-exposure film pack is small enough to be put into your pocket, yet each contains a wafer-thin, 6-volt battery that provides fresh power to operate the camera every time you load fresh film.

A unique picture counter, located on the back of the camera, tells you how many pictures you have left. When you insert your film pack, the counter reads "10." After each successive shot, that number decreases. It even prevents the flash from firing after all 10 pictures have been taken.

Flash pictures.

Just as there are 10 exposures in each film pack, there are 10 shots on each GE FlashBar™ array (5 on each side). You can shoot flash pictures from 10 inches to 20 feet or more away. Once again, you can reshoot every 1.5 seconds, to get a full action sequence.

Nothing being left to chance, the SX-70 electronically selects the next flash to be fired. And, as you focus, the lens aperture is set automatically to let in the correct amount of light.

Outdoors, an electric eye reads the light and programs the electronic shutter for the correct exposure.

Copies and enlargements.

Because SX-70 pictures can record far more detail than the unaided eye can see, and because they are reproduced in a whole new spectrum of vibrant, highly stable dyes, beautiful copies and enlargements are easily made.

Every time you load new film, a cover sheet is automatically ejected from the front of the camera, on which you'll find directions on how to obtain copies and enlargements of your favorite SX-70 original pictures.

The new photography.

The virtual cascade of revolutions, mechanical, chemical, optical and electronic that made the SX-70 possible had only one purpose: to free you from everything cumbersome and tedious about picture-taking, so it could become at last, the simple creative act it should be.

Just frame, focus and touch the red electric shutter button. Your picture is automatically ejected to time itself and develop into a color photograph of a depth and brilliance unparalleled in amateur photography.

What once might have seemed a family duty, or even just an interesting hobby, can now become a spontaneous and recurring pleasure in your daily life.

The SX-70

Light, handsome, ingeniously complex, utterly simple to use. See the ultimate camera from Polaroid at your dealer today.

The SX-70 camera with optional leather carrying case.

Polaroid®

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"Out here on the energy front

Shell men are working 12 hour shifts, 24 hours a day, 7 days a week, 365 days a year."

"Welcome to Grand Isle Block 76, 24 miles from land in the Gulf of Mexico.

"This is Shell's drilling rig number 11, the home away from home for 36 men. We're on seven days, and off seven days.

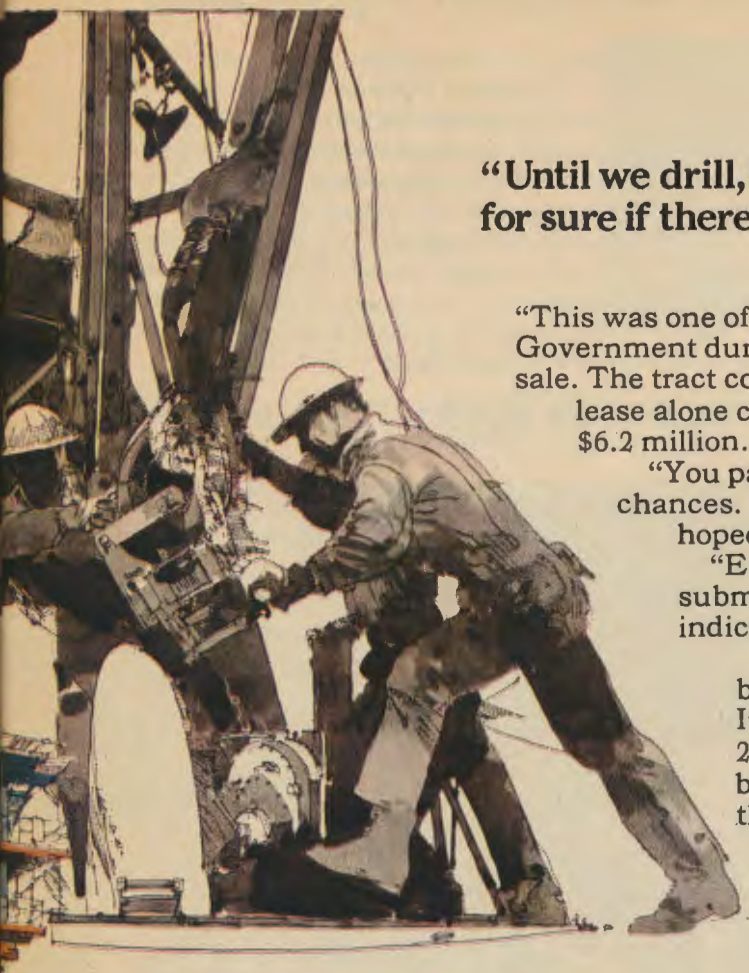
"During the seven days on, we work here, sleep here and eat here.

"Of course, we get some relaxation. We have TV, films, magazines, cards, and the fishing is pretty good.

"But after a 12-hour shift, you usually have about enough zip left to grab a bowl of Shorty's gumbo (which we think stacks up to anything you'll find in New Orleans), watch a little TV—then get some sack time.

"It's hard work. But we think it's important work. It's also satisfying to be with a leader. Shell is the largest oil producer in the Gulf of Mexico."

—Al Rivet
Rotary Engineman, Shell Rig 11



"Until we drill, we don't know for sure if there's oil, gas or 'nothing' down there."

—Chester Robinson
Drilling Foreman, Shell Rig 11

"This was one of 78 tracts offered by the Federal Government during the September, 1972 lease sale. The tract covers about 5,000 acres and the lease alone cost Shell and its partners $6.2 million.

"You pay your money and you take your chances. We did all right here. As we had hoped, we did find natural gas.

"Exploratory drilling, using the semi-submersible rig, *Ocean Explorer*, indicated a discovery.

"But the platform still had to be built. The wells had to be drilled. In all, Shell estimates it'll take about 2½ years and over $17 million spent before we sell a penny's worth from this platform."

"How's the fishing?"

—Eugene A. Shinn
Shell Marine Specialist,
Environmental Affairs Dept.

"Off the rig, it's good.

"However, you can drop bales of old rubber tires in the Gulf and get the same effect—an artificial reef.

"Artificial reefs almost invariably improve fishing—in their immediate area.

"The first well off the coast of Louisiana was drilled in 1937. Since that time the fish catch has shown a significant upward trend.

"We don't claim any credit for that, but it's nice to see the Gulf's fishing industry doing so well.

"And our production people tell me that starting around January, 1975, this one platform should start producing enough natural gas every day to heat about 40,000 homes in the northern part of the country—on one of their colder days."

SHELL **People working with energy**

A satellite program that discovers people.

They're being discovered down here on earth. In fact, right in New York City. With three locations called "Satellite Academies," the Satellite Program is designed to keep kids in school who want to work, or have to work. The program is set up to let them alternate between going to school one week and working one week.

Some of the classes are held in office buildings in the Financial District where they learn basic skills needed by New York City businesses. The rest of the curriculum is taught all over the city where kids discover their talents in such areas as photography, modern dance and theater. These courses are given by professionals.

For the past nine years Chase has been involved in aiding education and employment programs similar to this one. And we've put over 800 kids through our own training programs. So far we've sponsored 100 kids for the Satellite Program. And because the program is fully credited some kids will go on to college. Others will be offered jobs at Chase or other companies.

The Satellite Program. A good environment for kids who want to learn. Who want to work. And who want the world to know they've got something worth discovering.

If you know any kids who need help getting discovered, call the Satellite Academy Program at (212) 374-1412.

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Future Indicative

In writing of the next 50 years, some contributors to this special issue have elected to peer into the future from the present. Others, choosing retrospective speculation, have placed themselves in 2024 and looked back. *Caveat lector.*

August 24, 1974

Anniversary Issue Editor:
Horace Sutton

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Prophecy and Pessimism

What is most significant perhaps about the articles in this issue is the absence of doomsday prophecies. Generally, symposia or conferences of experts on the future have a dominant tone of pessimism. The reasons are natural and understandable. Authorities work with facts. And, because the facts about the human situation today are somber in the extreme, any extrapolations are bound to be discouraging. Given a problem in which the intensifying factors are readily identifiable, the experts feel they can assume a high probability of crisis or breakdown.

Yet it is precisely because the experts confine themselves to projections based on facts that their predictions are vulnerable. For history is shaped as much by intangibles as by hard facts. The biggest changes of the twentieth century were not foreseen by the experts. They had no way of anticipating the tides of political change that were to sweep over the world. They had no way of knowing where or how human hopes or fears would be suddenly created into vast surges of energy that would transform political, economic, and social institutions.

Obviously, the intangibles can be bad as well as good. No one predicted that the economic and social chaos in Germany after the First World War would produce an Adolf Hitler and a war that would take 60 million lives. The attempted conquest of Europe by Nazi Germany, however, was ultimately blocked by an intangible known as the human spirit. The magic of Winston Churchill's words enabled the British people to persevere at a time when many experts believed their defeat was inevitable.

Another example of the way human personality can surmount supposedly inexorable forces is supplied by Franklin D. Roosevelt. All the combustibles for social and political revolution were on the verge of being ignited when F.D.R. came to office. He provided the American people with the greatest intangible of all—confidence in themselves and in their institutions.

The experts were unable to predict the dominant changes in the shape of the society and in the living styles of the people brought about by men like Thomas Alva Edison, Henry Ford, Charles F. Kettering, Elihu Thomson, Guglielmo Marconi, Michael Faraday, Alexander Graham Bell. Similarly, they were unable to foresee the general impact of discoveries by Sir Alexander Fleming, Enrico Fermi, Leo Szilard, Pierre and Marie Curie, and Jonas Salk.

The most important factor in the complex equation of the future is the way the human mind responds to crisis. Arnold Toynbee's *A Study of History* makes the point that the greatest of all historical forces are set in motion when people decide to pit themselves against serious challenge. Human experience is not a closed circle. It is full of magnificent detours and sudden departures from predicted destinations.

Theoretically, then, what are the positive intangibles that might provide hope for the future? Regardless of hard facts, is there any prospect that the world's population can be brought into balance with the food supply, that a workable peace can be organized, that the dangers represented by the spread of nuclear weapons can be turned back, that the world's water supply and its atmosphere can be safeguarded, that the world's resources can be used for the common good?

Let's begin with the interacting food-population crisis. All known facts point to a famine of world dimension. The number of mouths that have to be fed is increasing faster than the food supply. Arable land is shrinking under the pressure of proliferating humans. Each year an estimated 80 million acres are lost to cultivation because of spreading cities and land erosion. In the second most populous nation in the world, India, a combination of droughts in the interior and monsoon flooding in the east has flashed ominous warning signs of widespread famine. In the vast African heartland, hunger has already claimed hundreds of thousands of lives. The relief missions cannot step up their operations fast enough to keep pace with the spreading zones of starvation.

Meanwhile, the world faces a fertilizer shortage that is directly related to the oil shortage. It takes one ton of petroleum to make one ton of fertilizer. The poorer nations of the world are being priced out of the fertilizer market.

A comprehensive world plan for averting a disaster has yet to be devised. Most of the obvious approaches have serious flaws. It is said, for example, that the best way of attacking over-population is by upgrading the standard of living. This reasoning cites the fact that industrially advanced societies have a much lower birth rate than do the poorer countries. What this argument overlooks is that the per capita depletion of the world's resources is far higher in the industrialized countries than in the developing countries. The average American consumes 7 times more food and 20 times more of

the world's natural resources than does the average Asian. Obviously, improvement of the human condition is the first obligation of society. Human beings have to be liberated from squalor—whatever the debate over the effects. But it is a serious mistake to think that shortages of resources will be solved just by a drop in the birth rate. The question of population pressure has to be correlated with all the other factors involved in the drain on the world's non-renewable resources.

Certainly, no time should be lost in creating a World Food Authority under the auspices of the United Nations, using the present Food and Agriculture Organization as a base. A WFA could support and expedite research in nitrogen fixation, a process that has the potentiality for cutting fertilizer prices by more than half and for increasing the food yield by at least half again. A WFA could also have the capability for undertaking research in desalinization, the purpose of which would be to find vastly cheaper ways than now exist for increasing the supply of water for agriculture. A WFA might even be able to set world food production goals in anticipation of total needs.

Perhaps even more serious than the under-supply of food in the world is the over-supply of nuclear weapons. These holocaust-making devices are being accumulated in vast numbers. The current estimate is that about five times as many such weapons exist as would be required to expunge all cities on earth. The fact that the nations are permitted to continue to pile up these explosives is itself a terrifying commentary on the nature of national sovereignty in the modern world.

It is madness to assume that all the heads of state who have access to the nuclear weapons are men of wisdom and restraint. If the turbulence of government and politics has taught us anything at all in the past half-century, it is that men at the top are as prone to wild aberrations and insane judgments as are other mortals throughout human society. Government leaders who believe such weapons are essential to the public security confess their unfitness to superintend the human future.

Here, too, the only thing greater than the danger is the assumption that it cannot be turned back. There is a chance, and a good one, that nuclear weapons can be brought under control if world opinion reacts to the problem with a blazing and sustained intensity. If statesmen are given to understand that their political lives depend on progress in this direction, the progress will come.

It will not be enough, however, to create a clamor. Public concern must find its focus in the need for effective world organization. Every major problem in the world today calls for a world response. It is impossible, in fact, to think seriously about such problems without recognizing that they all point to the need for transforming the United Nations into a series of effective authorities, as part of a world organization with law-making and law-enforcing powers. Moreover, it is difficult to see how the world can feed itself adequately, or how the arms race can be halted, or how we can keep outer space from becoming a nuclear shooting gallery, or how we can keep the world's air and water from becoming poisoned, or how we can head off the predatory competition among nations for ownership of the resources of the seas, or how new sources of energy available on a large scale can be developed, unless the United Nations is made into a genuine organization with primary responsibility for the conditions of life on planet Earth.

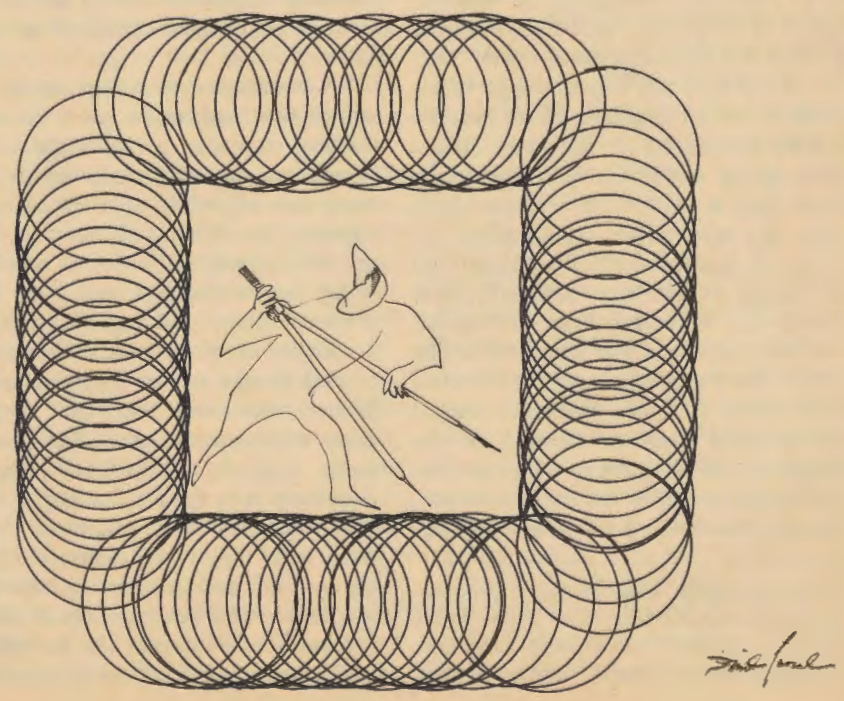
The sum total of all these agencies, properly related under world law, is what is meant by world order. The agencies cannot work in isolation. They must have a common source of authority. The tendency to abuse that authority will be great, always a danger whenever power is created. But the alternative to abuse of power must not be anarchy, which is the present condition in the international arena. The antidotes to abuse of power are checks and balances, constant searchlighting, constant review and overhaul, open communications to the fullest extent possible, limited appointment or election of officials.

The value of the pessimistic forecasts of the Club of Rome or the Hudson Institute is that they serve as an early warning system. People must not be permitted to think we will drift away from danger. Massive efforts are required. And it is possible that only the shock of recognition will produce the energy required to make these efforts.

Our argument is not against honest alerts. Our argument rather is against the notion that the human race is locked into a grim inevitability. No one, no matter how great his expertise, knows enough about the future to say that we have passed the point of no return. He may be the supreme authority on his own subject, but he cannot predict the workings of the human mind. The way the human mind will respond to any given situation is the kind of intangible that can become the dominant reality of tomorrow.

If enough people can be found who are willing to attach themselves to the proposition that the human species is sufficiently intelligent and energetic to think and to work in world terms, the pessimistic forecasts of the experts will lose their power to paralyze or intimidate. The biggest task of humanity in the next 50 years will be to prove the experts wrong.

N.C.



Museum of Modern Art

The Spirit of Place—*"Throughout history, place-makers have imposed a distinctive pattern of man-nature relation-*

Recycling Social Man

The next fifty years must not be an extrapolation of today, but an original mode of life that seeks qualitative change rather than quantitative growth.

by René Dubos

I arrived in the United States as a 23-year-old immigrant in October 1924, half a century ago! I have moved a great deal since that time—from laboratory work in soil microbiology to interest in human settlements—all over the United States and to the most distant parts of the earth. Travel is now much faster than it was in 1924; yet paradoxically the adventurous young people of 2024 will find it more difficult than I did to change at will their nationality and occupation. Wars may become rare, but national suspicions will long persist. The world may be better organized, but this will mean more social regimentation and occupational standardization. On the whole, however, America will continue to be regarded as a land of Cockaigne, because our material abundance will still be beyond the reach of most other human beings. In many other parts of the world, soybean ersatz will be the nearest approach to gourmet dining, and a room of one's own will be the height of selfish luxury.

We have reason to marvel at our technological achievements, but we must remember that they are only the current expressions of trends that were initiated more than a century ago; our own contribution has often been to push these achievements to the point of absurdity. Vigor and turbulence have been more characteristic of the past 50 years than originality of thought or understanding of real human needs. I am inclined to believe, however, that the next 50 years will witness a more humane and more original approach to life. An awareness is in the air that doing essentially more of what we have already done, only bigger and faster, is not for the sane and that we must find other ways to peace and happiness. The most significant contribution of the Seventies to the future may well be the rejection of the view that quantitative growth inevitably brings about a better life, and the beginning of a search for qualitative, rather than quantitative, changes. In this hope, I shall try to visualize 2024, not as an extrapolation of present trends, but as a picture of what human beings can achieve when they make up their minds to escape from social determinism.

THE 1933 CENTURY of Progress Exposition at Chicago was focused on the contributions of scientific technology to economic development. The social philosophy of its organizers was clearly stated as follows in the guidebook of the fair: "Science discovers, genius invents, industry applies, and *man adapts himself to, or is molded by,* new things. . . . Individuals, groups, entire races of men, *fall into step* with . . . science and industry."

The extent to which this philosophy has influenced technological civilization is reflected in the many articles and books that were published during the Fifties and Sixties to forecast what the world would be like in the year 2000. Emphasis was then entirely on far-out technologies, with no mention of human needs. It was commonly assumed that there are no limits to the growth of science, that almost all scientific knowledge can be converted to practical ends, and that all technological developments eventually find a useful place in human life. From this it followed that we were about to enter a technological utopia. For several different reasons, however,

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A microbiologist, René Dubos is professor emeritus at Rockefeller University. He is, as well, a Pulitzer Prize-winning author. His new book, Beast or Angel?, *appears this fall.*

earthly goods." Bacon reiterated over and over again that "knowledge is not to be sought either for pleasure of the mind, or for contention, or for superiority to others, or for profit, or fame, or power, or any of these inferior things; but for the benefit and use of life." Like Bacon, most people still believe that science can greatly contribute to the enrichment of life.

For example, scientific criteria will increasingly be used in the definition of environmental quality; I shall mention one technical aspect of this problem that relates to economic policies. In the future, industrial and domestic effluents will be considered, not as wastes, but as resources; we shall develop new technologies to make use of them. In view of the expected worldwide shortage of many resources, recycling of wastes will become a socioeconomic necessity, and this will prove to be the most economical and effective method of pollution control.

Environmental quality, however, includes much more than chemical and physical cleanliness. Privacy, space, and quietness may not be essential for survival, but they are needs deeply rooted in human nature, and the demand for them increases with prosperity. Rural America came as close as any society has to providing these amenities when most people lived in freestanding, isolated houses. This kind of dwelling, however, is not likely to be common anywhere in the world of 2024.

The isolated freestanding house emerged at a time when there was much unoccupied, inexpensive land. Furthermore, the house was then essentially self-sufficient, with its own water supply from a well or a stream; its own fuel supply from the woodlot; much of its own food supply from the garden, domestic animals, and wildlife; and few problems from neighbors about waste disposal. In contrast, the freestanding house is now increasingly dependent on public services—for electricity, telephone, water, sewage systems, fuel for heating and transportation, road maintenance and snow removal, and so forth.

Pleasant as it is, the way of life implied by the freestanding house now involves very high social costs, especially with regard to labor and energy. Because labor, energy, and open land will become increasingly scarce and expensive, the isolated freestanding house will become an economic burden too heavy for the average person, as well as becoming socially unacceptable. It is probable that social constraints will soon create a trend to some form of cluster settlements.

Culver

Bacon—*"Not for profit, fame, or power."*

All over the world, in the poor as well as in the rich countries, planners and architects are studying how human settlements can be designed so as to provide both the technological advantages of cluster housing and the sense of space and privacy associated with the freestanding house. I am rather optimistic in this regard, and I doubt that 2024 will see anything as bad as the tenements of the mushrooming cities during the first phases of the Industrial Revolution.

The United Nations Conference on the Human Environment, held in Stockholm during June 1972, put special emphasis on pollution control and on management of natural resources—in other words, on the forces that play a role in the sustenance of our bodies and that keep the economic machine going. These problems have been made universal by the general increase in mobility and by the standardization of technology. In this respect at least, the One World advocates have some chance of success. Standardization, however, will affect only limited aspects of life and of the environment —for example, means of transportation, facilities for travelers, safety of air, water, and food, and other services common to large groups of people. The travelers of the twenty-first century will move through repetitive networks of airlines and throughways to reach a similar maze of lobbies, elevators, bedrooms, meeting rooms, snack bars, and restaurants. This will be boring but will help the traveler to orient himself in a new place and to function in it comfortably, thus sparing his time and energy for appreciating what is unique and interesting in the land of his destination.

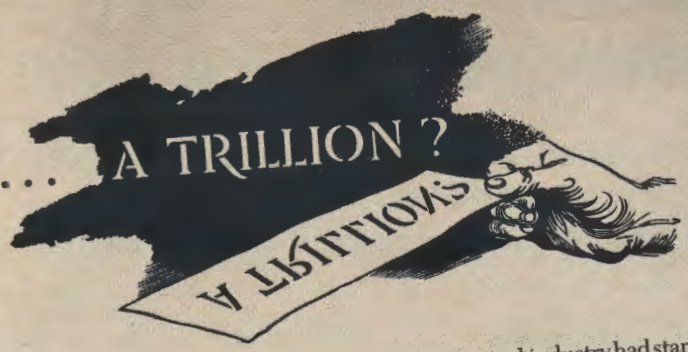
While there is throughout the world a powerful trend toward uniformity with regard to those aspects of life that are common to all human beings, there is simultaneously an opposite trend toward regionalism. There will be many local worlds in the One World of 2024. One of the reasons for the survival of regionalism is that we demand more of the environment than providing health and economic security. The quality of our lives includes emotional and spiritual satisfactions that have their origin in our contacts with our physical and social surroundings. The very trend to uniformity and the sense of boredom it connotes tend to make us increasingly interested in the unique characteristics of the place where we live and in its traditional lifestyles. The cultivation of the sense of place will become increasingly important in the decades to come.

It seems incongruous to speak of spirit of place at a time when the mobility of people is so great and when surroundings change so fast that identification of a particular person with a particular place seems all but impossible. But there are still elements of stability in the technological world. Even in areas that have been plowed, bulldozed, built upon, there persist some stubborn peculiarities of the place that enable it to retain its identity—some local characteristics of the air and of the light, despite the smog; a relationship between soil, rock, water, and slopes despite manipulation by real-estate developers; the rhythm of the seasons despite the promiscuous use of air conditioning; an awareness of the past despite the disappearance of landmarks and monuments. The persistence of topographical, climatic, and historical evidences of uniqueness affects the attitudes of people toward life and helps them in maintaining traditions that, though they may be subconscious, are reflected in social behavior and even in mannerisms of speech.

The trend to regionalism is worldwide. Each nation and ethnic group uses the United Nations as a platform to publicize its identity. Folklore, historical societies, and local museums are in fashion; they are witness to the fact that regional loyalty is more natural to human kind, biologically and socially, than is rootless drifting. Although there have been vast movements of population in the past, the migrants eventually settled down to become the local peasantry or aristocracy. Mass movements still occur now, but they do not last long. Even in the United States, mobility eventually

(Continued on page 102.)

BY 1970... A TRILLION?



"Butcher, butcher, kill ox;
Ox won't drink water;
Water won't quench fire;
Fire won't burn stick;
Stick won't beat dog;
Dog won't bite pig;
Piggy won't get over the stile,
And I shan't get home tonight!"

KEEP this nursery rhyme firmly in mind, and it will be easier to understand a dramatic and similar chain reaction now happening in America.

Like the old lady in the rhyme, Uncle Sam wants action—steel, aluminum, defense production. Two billion pounds or more of aluminum this year, for example.

...But we won't get more aluminum without more plants.

...But plants won't run unless we have more electricity—and lots of it. (For instance, just to make the aluminum planned this year, it will take as much electricity as 125 million homes would use.)

...But there won't be this electricity unless we have more turbines and generators to make it.

...But there won't be more turbines and generators coming into towns on flatcars unless somebody had started making them more than a year ago. It normally takes 64 weeks to build a modern turbine-generator, even after design and engineering have been done.

...But a lot of these extra turbine-generators couldn't have been started over a year ago unless people in the electrical industry had started expanding their plants several years before that.

Now we come to things that kept this chain reaction from fizzling out:

The aluminum industry *did* forecast increasing uses for aluminum, and planned expansion.

People in the electric utility business *did* forecast America's needs for electric power up to five years ahead, and placed orders.

The electrical industry *did* forecast what it would take to build the turbines and generators the utilities would need. Six years ago, in the pessimistic postwar year of 1946, General Electric broke ground for a vast new turbine plant. When this was completed in 1950, General Electric's turbine-manufacturing capacity was upped 60 per cent.

So it looks as if Uncle Sam will get his two billion pounds of aluminum this year. A lot more than we could produce in a hurry unless some people had acted on the right hunch about America's needs—five or six years ago.

We wrote this story about aluminum. We could have written the story about steel, or chemicals. America's electric generating capacity must backstop them all.

That's why electric output is a good measure of a nation's current productive strength.

Here some figures worth thinking about:

U.S. electric output in kilowatt-hours

1940.....140 billion
1950.....330 billion
1960.....600 billion (est.)
1970.....one trillion?

A trillion kilowatt-hours of electric power for America by 1970? When business foresight is added to research and engineering under a free economy, things like this can happen.

You can put your confidence in—

GENERAL ELECTRIC

This General Electric advertisement first ran in SATURDAY REVIEW May 24, 1952.

It predicted that by 1970—eighteen years later—America's need for electric power could reach one trillion kilowatt-hours.

At the time, that seemed a startling prediction. However, by 1970 U.S. electric output had passed that figure by almost 40%.

During those 18 years, the electrical industry, including equipment manufacturers like General Electric, constantly revised its predictions. Constantly planned ahead to meet that growing need.

Today planning ahead is more difficult than ever before.

But predictions now say the U.S. will need two trillion kilowatt-hours before 1980. So the electrical industry continues to plan ahead. Continues to develop the products that will be able to meet America's needs.

Progress for People.

GENERAL ELECTRIC

Tomorrow: The View From Red Square

A famed Russian sees a world of flying cities, freight-carrying dirigibles, and arctic farming, adding a recipe for progress in human rights.

by Andrei D. Sakharov

It is almost unanimously accepted that of the factors that will determine the nature of the world in the coming decades, the most important are population growth (by 2024 there will be more than 7 billion people on our planet); depletion of our natural resources (petroleum, the natural fertility of the soil, clean water, and so on); and serious disruption of the ecological balance and man's environment. These three indisputable factors create a depressing context for any forecasts. But equally indisputable and significant is yet another factor: scientific and technological progress, which has gathered steam during the millennium of the development of civilization and only now is beginning to fully unfold its brilliant possibilities.

The most important unknown in any predictions is the possibility of the destruction of civilization and the human race in the holocaust of thermonuclear war. As long as thermonuclear missiles and hostile and suspicious governments and groups of governments exist, this horrible threat will be the cruelest reality of contemporary life.

Mankind is also threatened by the decline of personal and governmental morality, which manifests itself even now in the disintegration of the basic ideals of law and justice in many countries, consumer egotism, the general growth of crime, the new international disaster of nationalist and political terrorism, and the destructive spread of alcoholism and drug addiction. The causes of these phenomena vary from country to country.

In the present state of the world, when there is an enormous and ever-growing rift in the economic development of various countries and when the world is openly dividing into opposing groups of governments, all the dangers that threaten mankind increase by an incredible degree.

The Socialist countries are responsible for a major portion of this increase. I must talk about it here, because as a citizen of the most influential Socialist state I bear my part of that responsibility. The party and state monopoly in all aspects of economic, political, ideological, and cultural life; the persistent burden of the uncovered bloody crimes of the recent past; the permanent suppression of nonconformist thought; the hypocritical, self-praising, dogmatic, and often nationalistic ideology; the oppression in these societies, which hinders free contact between their citizens and citizens of other countries; and the formation in Socialist states of an egotistic, immoral, smug, and hypocritical bureaucratic class —all this creates a situation that is not only unpleasant for the people of these countries but also dangerous for all mankind.

The citizens of these states are unified

Andrei D. Sakharov, father of the Russian H-bomb, co-founder of the Committee on Human Rights, and a long-time critic of Soviet policy, is the author of Progress, Coexistence, and Intellectual Freedom.

to a great degree in their goals by propaganda and several indisputable achievements and are partially corrupted by the lure of conformism. Yet at the same time they are suffering and are irritated by their constant lag behind the West and the real opportunities of material and social progress.

The bureaucratic leadership by its nature is ineffective in solving the current problems of progress. It concentrates on immediate, narrow interests, on the next report to the government. Such leaders are ill equipped to actually worry about the interests of future generations—for example, about preserving the environment—and can only allude to such issues in formal speeches.

What opposes or can oppose (should oppose) the destructive tendencies of contemporary life? I feel that it is particularly important to halt the disintegration of the world into antagonistic groups of states. The convergence of the Socialist and capitalist systems would be accompanied by demilitarization, the strengthening of international trust, and the defense of human rights, law, and freedom. Profound social progress and democratization would follow, and man's moral, spiritual, and personal resources would be strengthened.

I imagine that the economic structure that would arise as a result of this convergence would have to be a system of the mixed type, with maximum flexibility, freedom, social mobility, and opportunities for worldwide regulation.

A major role must be played by international organizations, such as the United Nations and UNESCO, in which I would like to see the beginning of a world government with guiding principles based on global human rights.

BUT IT IS IMPERATIVE to take the important transitional steps that are possible now. The simplest and most urgent step is a universal halt to such intolerable actions as the persecution of non-conformity. Already existing international organizations—the Red Cross, WHO (World Health Organization), Amnesty International, and others—should be allowed to go wherever there could possibly be violations of human rights, first and foremost into prisons and psychiatric institutions. The issue of free movement throughout the planet—emigration, re-emigration, and private travel —must be resolved democratically.

The resolution of that issue is particularly germane to overcoming the oppression of closed Socialist societies, to creating an atmosphere of trust, and to bringing closer the legal and economic standards of various countries.

I do not know whether people in the West fully comprehend what the newly declared freedom of tourism in the Socialist countries really represents or how much of it is for show, red tape, and cruel regimentation. For the few who are trusted, such trips are most often merely an attractive opportunity—paid for by conformity—to dress in Western clothes and generally join the elite. I have already written much on freedom of travel, but this real lack of freedom is the Carthage that must be destroyed.

I WOULD LIKE NOW to present several futurological hypotheses, basically of a scientific and technological character.

I imagine a gradual (completed long after 2024) growth of two types of territory out of the industrial world that is overcrowded and inhospitable to human life and nature. I will conditionally term them "Work Territory" (WT) and "Preserve Territory" (PT). The PT, larger in area, will be set aside for maintaining the earth's ecological balance, for leisure activities, and for man to actively re-establish his own natural balance. The smaller

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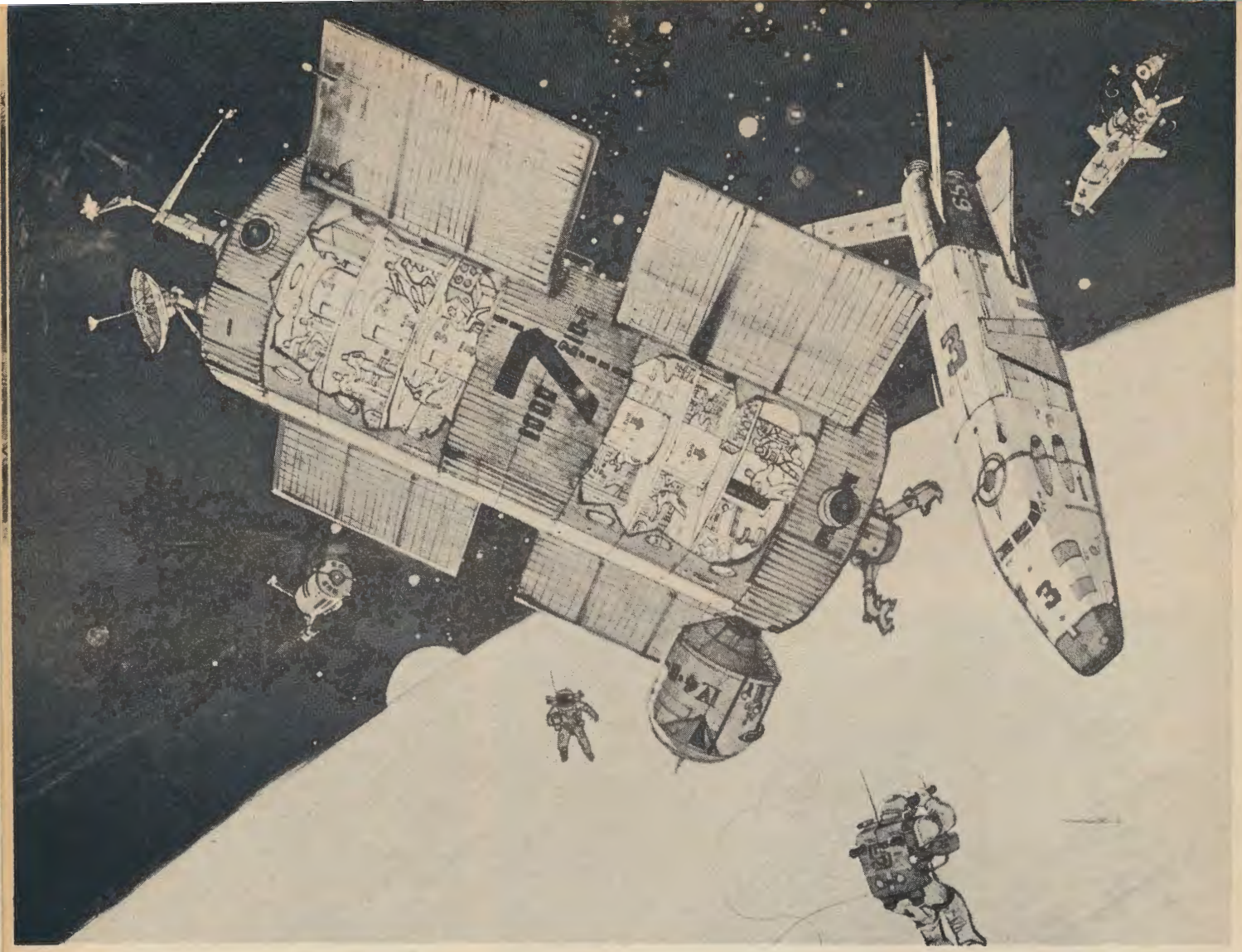
Illustrations by Robert McCall

Flying Cities—*"The satellites will house metallurgy plants, hothouses. . . . They will serve as cosmic-research laboratories and way stations for long flights."*



Docking Shuttlecraft—*"Information obtained 'out there' could have a revolutionary impact on human life."*

and more densely populated WT will be the area where people will spend most of their time.

The WT will have intensive agriculture; nature will have been transformed completely to serve practical needs. All industry will be concentrated in giant automated and semi-automated factories. Almost all the people will live in "supercities," the centers of which will contain multi-storied apartment buildings with artificially controlled climate and lighting, with automated kitchens, landscape walls, and so on.

A large part of the cities will be made up of suburbs that stretch for dozens of kilometers. I envisage those suburbs in terms of the suburbs of today's most comfortable countries: built up with small houses or cottages, with yards and gardens, children's organizations, sports fields, and swimming pools. They will have all the conveniences and comforts of modern urban living, silent and comfortable public transportation, clean air, arts and crafts, and a free and varied cultural life.

Despite its rather high population density, life in the WT, with the rational solution of social and international problems, need not be any less healthy, natural, and happy than the life of a person from the middle class of our present-day developed countries—that is, much better than is possible for the overwhelming majority of our contemporaries.

But the man of the future will have an opportunity, I hope, to spend part, even though it will be the smaller part, of his time in the more natural surroundings of the PT. I predict that people will lead lives with a real social aim in the PT as well. They will not only rest but also work with their hands and their heads, read, and think. They will live in tents or in houses they have built themselves, the way their ancestors did. They will listen to the noise of a mountain stream or simply relish the silence, the wild beauty of the outdoors, the forests, the sky, and the clouds. Their basic work will be to preserve nature and themselves.

Here is a statistical example. The area of the WT will be 30 million square kilometers, its average population density 300 people per square kilometer. Area of the PT, 80 million square kilometers; average density, 25 people per square kilometer. World population, 11 billion. People will be able to spend some 20 percent of their time in the PT.

A natural area for the expansion of the WT will be flying cities—artificial earth satellites with important industrial functions. Solar energy will be concentrated on them and perhaps a significant portion of nuclear and thermonuclear installations with radiant cooling of heat exchangers to avoid superheating the earth. The satellites will house vacuum metallurgy plants, hothouses, and so on. They will serve as cosmic-research laboratories and way stations for long-distance flights. Below both the WT and the

(Continued on page 108.)

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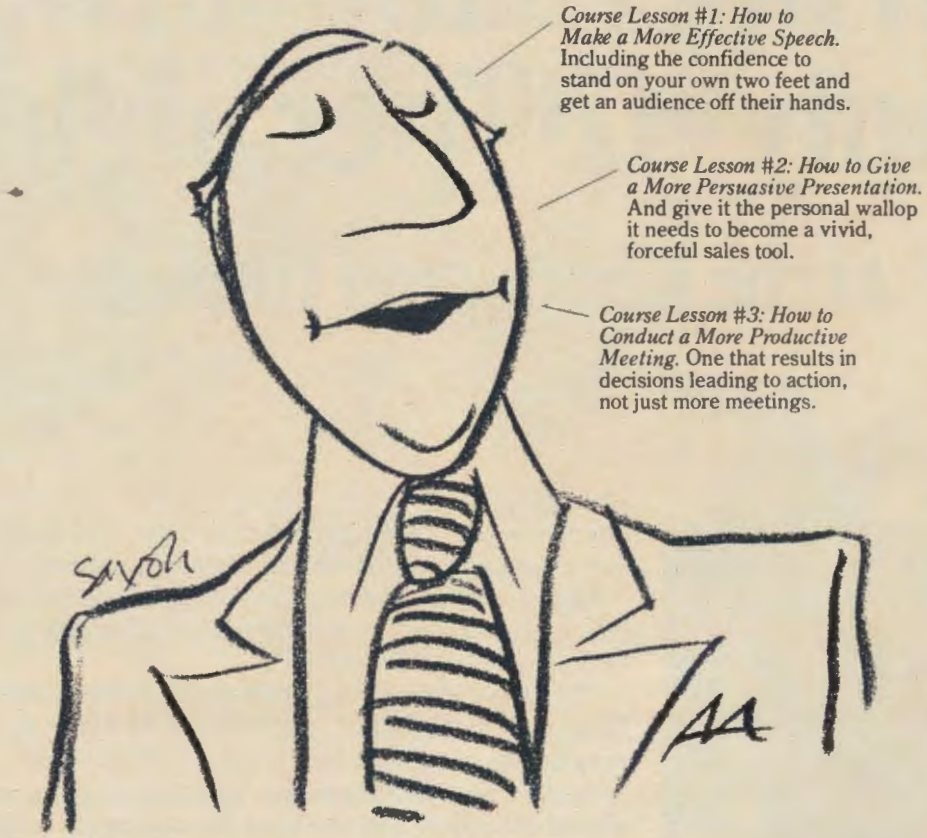

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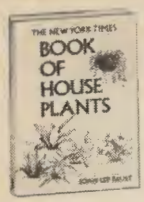

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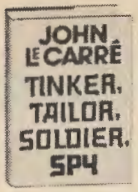

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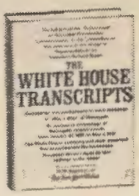

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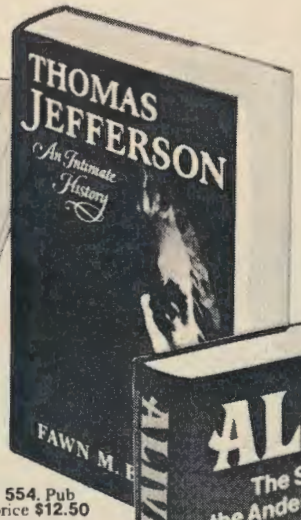

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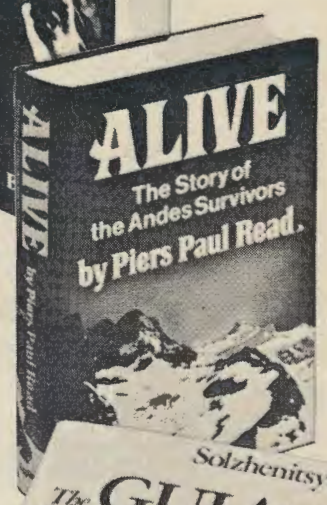

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After the Deluge, the Covenant

The sufferings and terrifying dangers of the 1980s inspired the creation of global law. A onetime White House aide looks back from the lofty heights of 2024.

Miriam Shottland

by McGeorge Bundy

The year 2024 has been marked by such worldwide turbulence that it has not been surprising to find in the year's commencement addresses a tone of pessimism that is more than a reflexive response to the skepticism of the young. Political crises in Europe, a bitter Eurasian debate over the true meaning of socialism, and a failure of political morality in the United States have combined to undermine the prospects for the critically important World Conference on Underemployment and Inflation set for the end of the year. With worldwide underemployment at 12 percent and the U.N. general inflation indicator at 3 percent per month, it is obvious that things may get worse before they get better. Pessimism is both easy and contagious.

In this situation it may offer some encouragement to look back at the history of the twentieth century. Fifty years ago the world's three worst problems were: nuclear weapons, hunger, and overpopulation. Not one of them has been a central issue for the last 25 years. Yet a futurologist of 1974 who predicted so bright a result would have been set down as a foolish optimist. So let us recall how the generation of the Eighties endured its own great sufferings and terrifying dangers, and how it ended those sufferings and brought those dangers under control.

First there were the Great Famines of 1979–81. They came a little earlier than most experts had predicted, because for three years in a row the world's harvests

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President of the Ford Foundation, McGeorge Bundy was a Harvard dean and a professor of government before becoming special assistant for national security affairs to Presidents Kennedy and Johnson.

were bad. Different areas were hit in different years, but there were crop failures each season in more than half the grain-producing world. Something like this was bound to have happened sometime—it happened in '79, '80, and '81. In the first year, by means of the full application of the limited-emergency power agreed on at the World Food Conference late in 1974, the year after the first Sahara famine, it proved possible to prevent large-scale starvation, but at the cost of lowering worldwide food reserves to a mere 12 days' supply—less than one-half the "record" low level of '74. The next year the thinly stretched network of worldwide supply disintegrated like a spider's web in a hailstorm. In the countries which suffered least, there were shortages that led to great riots, worse in the United States than any other in her history, worse in France than any other since her revolution. In the countries which suffered most, there was not so much rioting after the first famine—instead there was the terrible order that can surround a civic response to the inevitable, as the weak were forced to the wall by millions. How many died in those dreadful years we do not know even today. The latest estimate from the Historical Branch of the Food Commission gives a total of 65 million, but there are independent critics who believe these figures are still kept too low because of a lingering respect for the sensitivities of the governments whose peoples suffered most.

The Great Famines were a worldwide disaster, but their burden fell mainly on each nation individually. The rudimentary worldwide instruments for relief were simply overwhelmed, and indeed the pride of nations and the immediate political interests of governments worked overwhelmingly against the kind of common effort that might, even then, have reduced the impact of the harvest failures. Those who were affected most in the first year were the most self-regarding if their own harvests were better in the second, as they were for some. And those who did not suffer at the beginning soon had trouble enough at home to make them cautious indeed about generosity abroad. The wounds from all this suffering, shame, guilt, and fear were deep and not clean. The torment came to an end with the two vast harvests of 1982 and 1983, but the scars remained. Yet by early 1984 so little progress had been made in planning to prevent the next onslaught that the experts began to believe the nations had forgotten everything and learned nothing. It took another and quite different set of catastrophes to prove them wrong.

IT IS A SOUND CONVENTION that circumscribes most of our discussions of the Nuclear Events of 1984. We call them, neutrally, Events, and we do not use the old names of the three great cities that were destroyed—one in the United States, one in the Soviet Union, and one in China. Each has now been rebuilt, and each, in the language of its nation, is now renamed Remembrance. The 10 million who died have their monuments; the seared survivors have their special standing as honored citizens; the men who caused their deaths have been forgiven because of what they did in atonement.

The first set of explosions took place in the American city, entirely without warning, in a time of high triangular tension among Moscow, Peking, and Washington. The instant report of the U.S. Nuclear Uses Technology Reaction Analysis Team (NUTRAT) was to the effect that the radiological and other characteristics of the explosion were totally inconsistent with any but Chinese origin. The President then authorized limited-reaction plan 1975-Z calling for a precisely parallel response, and accordingly a quick-alert, land-based missile cluster of appropriate kilotonnage was launched against a Chinese city of comparable size, together with a diplomatic message broadcast clear. The Chinese, their attention focused sharply on Moscow, regarded the U.S. message as a Soviet deception, formed their own conclusions as to their real enemy, and launched a strike, again with comparable strength, against a city in Russia. By then the President had been informed by NUTRAT that its first report was wrong. He at once announced the error and offered reparations to both China and the Soviet Union. To their credit both accepted the offer in principle. The Summit of Vladivostok took place a week later, and the three Events were all there were.

It was rapidly discovered that the first Event was the work of terrorists. Their captured leaders were suicides. Two nuclear-energy companies with slack security and two small dictatorships with anti-American grievances accepted at least partial responsibility for the acts of the terrorists. The interaction of such events and such weaknesses had been an admitted possibility for years, but almost no one had taken it seriously. The reality, with all its human consequences, gave a fierce impetus to three great tasks: the care for survivors, the rebuilding of the Cities of Remembrance, and the achievement of the overwhelming and worldwide purpose that it must never happen again.

The solution to the third and largest task was as obvious as its achievement was difficult. It had been foreshadowed by David Lilienthal and Dean Acheson almost 40 years earlier. Dangerous nuclear materials of all sorts must come under international control. The Balance of Terror had prevented strategic nuclear war, but it had not prevented the

"The wounds from all the suffering, shame, guilt, and fear were deep and not clean. The torment ended with the harvests of '82 and '83, but the scars remained."

Events. It was not good enough. Indeed the Balance was no longer wanted—for as they considered what had happened and how nearly it had been 100 times worse, the peoples and governments of the three greatest nuclear powers found themselves at one. There must be no more Events. The rest of what was needed followed with a logic that had been as plain as it was "impractical" for decades.

In these circumstances the first and easiest steps were among the Big Three themselves. In a matter of months they had agreed to the principle of an Authority with all needed powers over all nuclear materials in the three countries. All such materials were to be removed from military jurisdiction; all production and disposal of all forms of nuclear material and all nuclear-energy installations of all sorts were to come under the Authority's supervision for security. This agreement was the easy part.

The hard part came with other necessary parties. There were other nuclear powers, other sources of nuclear material, and terrorist groups with wild ambitions outside the reach of the Three Powers. It was evident that those to be charged with nuclear safety could not hope to meet the minimum demands of the three stricken nations without a wider authority than could be found within the direct or indirect power of the three. It was urged by some that if the three had been willing to use their nuclear superiority with sufficient ruthlessness, they could simply have imposed their terms on all the world. But in the aftermath of the Events none of the three governments had any appetite for nuclear blackmail. The five other nuclear nations had more than enough weapons and more than enough unpredictability at the top of their governments to cause more and even worse Events. With them it became essential to negotiate.

For experts of 1974 the predictably complex bargaining would have been over the maintenance of "European security." As it turned out, no problem resolved itself more quickly. The Europe of 1984 was already weary of nuclear threats, nuclear umbrellas, and even Franco-British nuclear pretensions. The attractions of "merely" conventional weapons, after the Event, were made so obvious by opinion polls in Western Europe that governments easily overrode their military advisers, and in Eastern Europe other political pressures were equally effective. People argue still about the consequences—is today's Europe more like twentieth century Finland, Sweden, Switzerland, or Japan?

The most important negotiations were outside Europe, and here the decisive bargain was proposed by India, sixth in historic line of the "Nuclear Eight" of the day. Her price for partnership was an end to hunger. If India were to place the supervision of her nuclear materials under a new Authority, because the Events had chastened stronger states into common sense, then they in turn must take full account of India's central problem—the Famines, so much more terrible in their final human cost. Let there be a World Nuclear Authority, said the Indian government; we have believed in that from the beginning. But let there be a World Food Commission, too—let it have all the power it needs so that the Famines shall not return, and let the rich countries from then on do their full part to help the hungry. With the acceptance in principle of the Indian proposal, the Three became Four.

The bargain was a good one, but the catch in it was clear, as the French were first to insist. If the World Food Commission were to meet the minimum requirements of the Indians (joined by the other hungry states), then, as a matter of the simplest and most basic logic, there must be action, not rhetoric, on the population problem. Even the combined 75 million deaths of the Famines and the Events were less than one year's world net growth in human numbers, and the French position was beyond challenge: a pledge to end hunger without a binding agreement on population limitation would be empty.

Demographers still debate the terms of the Population Protocols of 1988, under which 70 states, including the 30 largest, pledged themselves to achieve stable populations at specific levels. It is unimportant that some states, like France herself, insisted on levels that their citizens have not chosen to meet. The largest cases here are the most interesting.

The Chinese proposed a final level for themselves of only 1.2 billion, and the rest of the world accepted the proposal with great relief. The Chinese had and still have a system that makes such matters relatively easy. There can be no doubt that politically the most difficult and important pledge was that of India, which also undertook to reach a stable population level at not more than 1.2 billion, "only" twice what it had been in 1974. The combination of incentives and penalties needed to achieve this result would have been inconceivable without the experience of the Famines, and there are Indians who still believe the price in human liberty was too high.

A MORE ARGUABLE CASE is that of Brazil. Was it wise for others to accept the Brazilian insistence that because of the wealth and emptiness of the country it should be allowed to stabilize its population at 400 million, four times the number of 1974, and level with the limit accepted by the Soviet Union? There are Brazilians today who argue that their government bargained against its own long-range interest, but the weight of scholarly opinion is that no Brazilian government could then have settled for less. And because of her size, wealth, and location, Brazil, the emerging Great Power of Latin America, was an indispensable member of the group that became known as the Founding Five. Brazil was innocent of nuclear guilt, almost untouched by the Famines, and full of a subcontinental self-confidence that was not unknown in any of the other four founding states.

The United States accepted much more modest population limits, not for lack of residual pride in numbers, but rather because the Americans had learned to read their own demographic prospects clearly, and because they knew their vulnerability to the charge that the average American baby would eventually lay a claim on the world's grain resources about 16 times as great as that of the average Asian.

The most intractable problems appeared in regions which had hunger in some places and fertile spaces in others; this was the situation in Africa and in the combined region of Southeast Asia and Australia. In these areas, essentially regional bargains were a necessary prelude to final adherence to the Protocols.

(Continued on page 112.)

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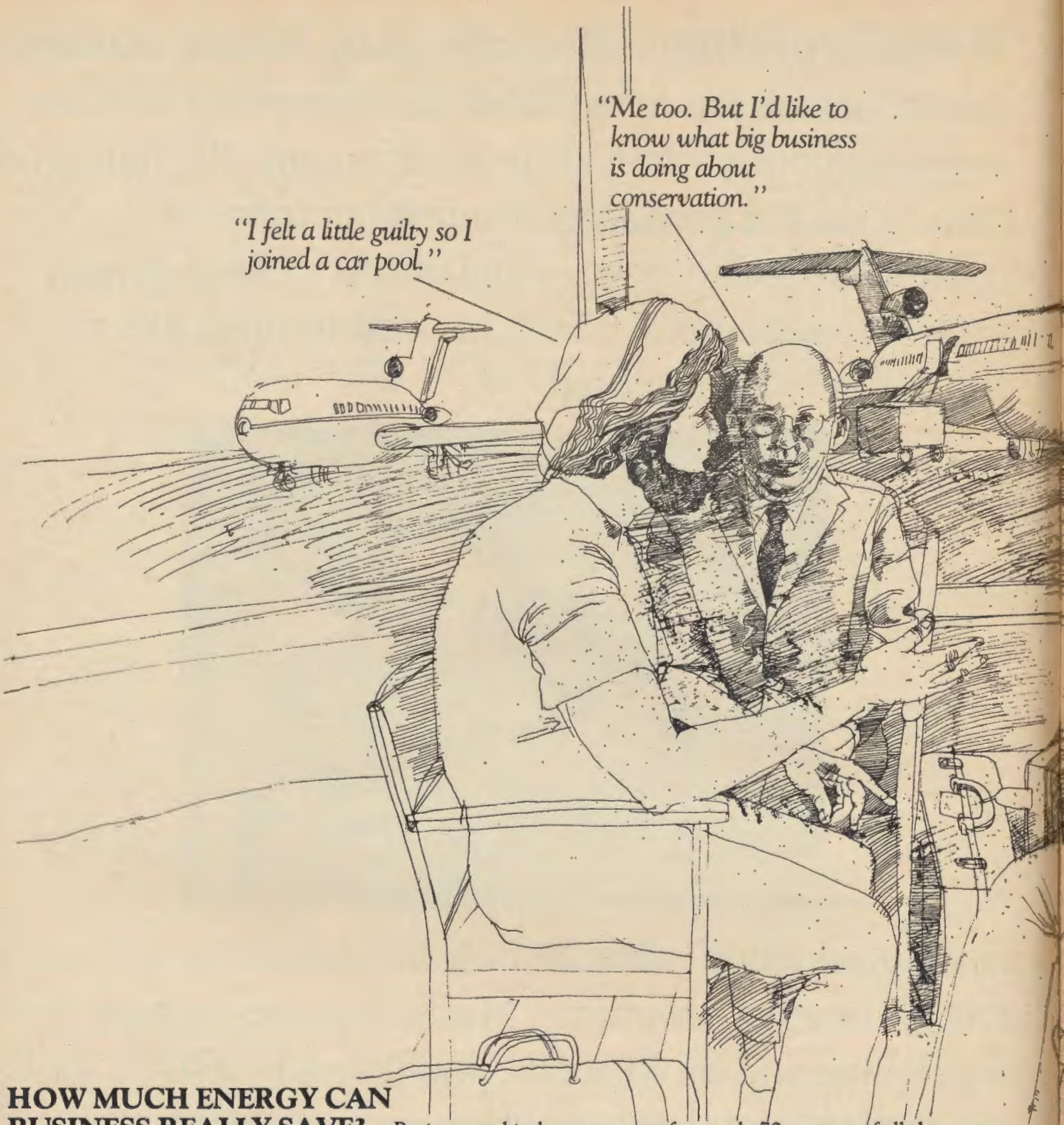

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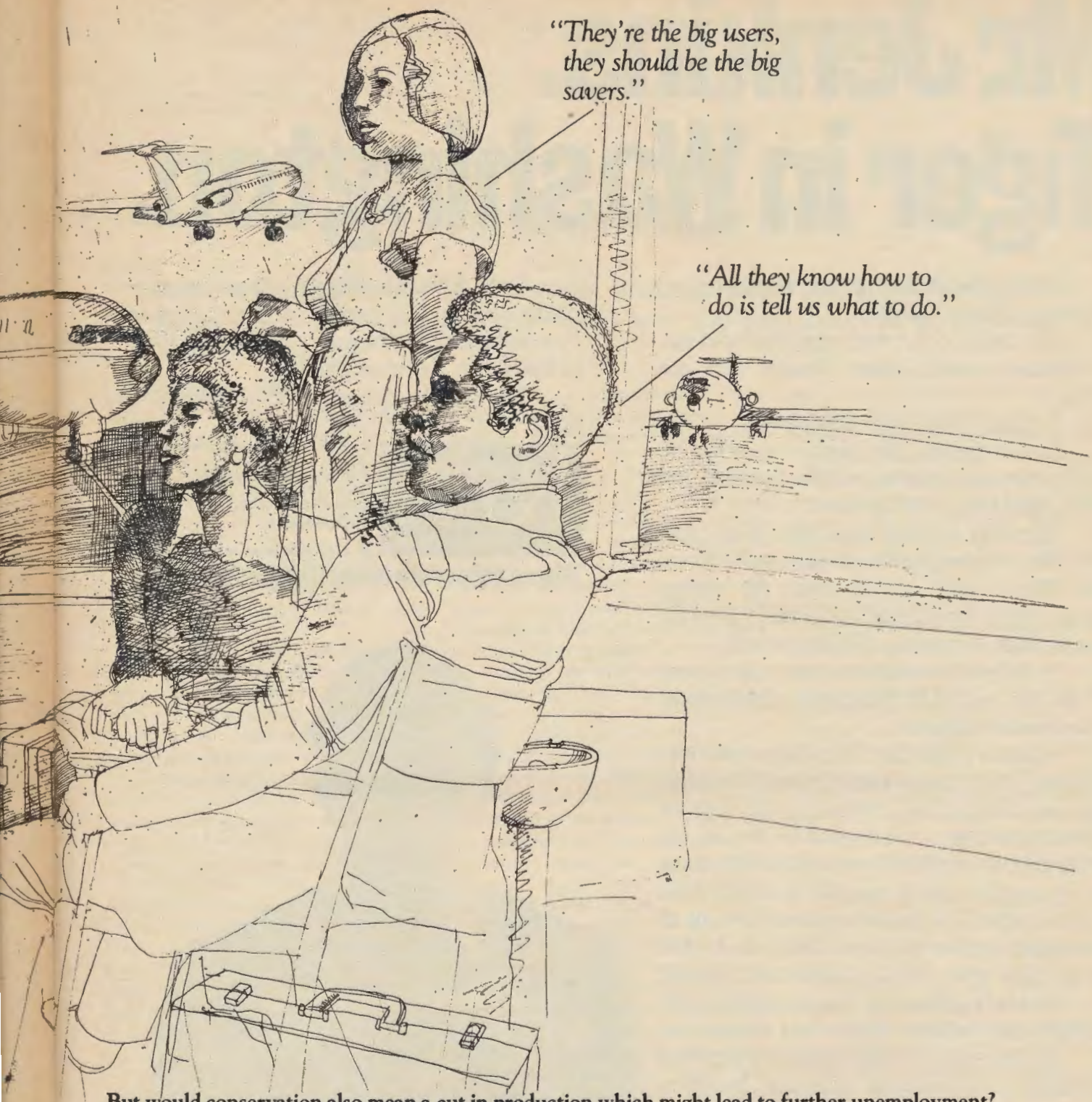

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A World Atlas for 2024

Four political scholars from diverse societies assay the geopolitics of 50 years hence and suggest (timorously) how national borders may change.

1. Milovan Djilas:

Prophecy is difficult and thankless, even for the prophets of the great nations, which alone bear responsibility for the fate of the world. We children of lesser nations, rebels as well against "our own" systems, too often mistake our own wishes and fears for reality. But even such prophesying is of some value, for without dreams and heresies, life, in both its human and its social aspects, would be incomplete.

For the world as a whole, the next 50 years will probably see changes in the borders of states become less frequent and less important than changes in the political and social systems. At first glance this proposition would appear to be contradicted by the obvious decline in *international* ideologies and the corresponding strengthening in *national* ideologies. The contradiction is only apparent, however, for future nationalisms—in contrast to those of the nineteenth and the early twentieth centuries—will be primarily ethnic and cultural rather than economic and expansionistic. National isolationism is impossible. Economic integration will proceed hand in hand with the strengthening of national identities.

The nation and all that is national are stronger than either ideology or economics. Ideologies are already only superficially international, while in reality they are national—Leninism in the U.S.S.R., Maoism in China. Economic ties are viable only if they do not run counter to the aspirations of nations.

National aspirations will lead to significant changes in national borders in those areas of the world where there are remnants of imperial conquests or where nations are just now emerging. This is true above all for Africa and Asia. North and South America, Australia, and Western Europe will not experience any significant changes in borders; the nations there are already free, and the drive for foreign conquests already has exhausted itself.

For the world as a whole, the most significant change in the next 50 years will be the disintegration of the Soviet empire. Numerous signs can already be discerned. All empires except the Soviet have collapsed; history is mocking Lenin —imperialism, instead of being the most advanced form of capitalism, is the most advanced form of sovietism! The ideology, that is, the totalitarianism, which until now has held the Soviet empire together, is already in disintegration. Among the Russian people, a national awareness and a yearning for freedom have reawakened. Soviet bureaucratism thwarts modernization. But the crucial factors will be the domestic ferment and the pressure from China, and in this connection we cannot rule out either war between China and the U.S.S.R. or uprisings in Eastern Europe.

China will annex Outer Mongolia and will occupy the territories east of Lake Baikal and the River Lena. The territories east of the Caspian Sea (Turkistan, Uzbekistan, Kirghiz, and Tadzhikistan) will secede into separate national states under Chinese influence. The Baltic states and the Ukraine will secede from European Russia and will form independent states. The Caucasian nations (Georgia, Armenia, and Azerbaijan) will probably secede and form, at least initially, an independent federation. Belorussia will remain in a federation with Russia. Through the disintegration of the Soviet empire, the Russian people will finally obtain freedom and stability, although the great-state bureaucrats and the imperialist nationalists will see in it the destruction of Russia.

With the collapse of the Soviet empire, the Eastern European countries now under Soviet hegemony will become independent and will join the European community. Germany will be united, without a civil war. The theory about the "German Socialist nation" is a utopian construct of the East German leaders to meet their own momentary needs. Decrees have never created nations—nations spring up—nor can decrees keep nations permanently divided.

Korea will also be reunited, as will Vietnam and Laos, probably before the end of the century. Similarly, Taiwan will be reunited with China, and the Sakhalin and Kuril Islands with Japan.

Despite my sympathy for India, I am not convinced that it can remain united in the long run. The present linguistic units will gradually become independent, and the southwestern, southern, and southeastern parts of India will, most probably, separate into independent states.

Likewise, in (West) Pakistan the national movement of the Beluchistans will grow, and they will finally attain independent statehood.

In Europe—with the exception of Russia, which has already been discussed —only Spain and Yugoslavia will experience changes. Spain will be organized on a federal basis, with the Catalonian and Basque regions obtaining significant autonomous rights. Yugoslavia will become a confederation of four states: Slovenia, Croatia, Macedonia, and Serbia, with Serbia itself being a federative state. It is possible that those four states may later separate and become fully independent, but they will still be part of the overall European economic and political framework. In any event, when these nations attain independent statehood, the acrimony among them will diminish and cooperation will increase

Maps by Robert Pelletier

on the basis of full equality. The most powerful state in the Balkans will be federal Serbia.

The stormiest changes will occur in black Africa, where nations are just beginning to form and where borders, in the main determined by the interests of the "white" great powers, frequently cut through the middle of ethnic groups. Without extensive knowledge of ethnic, geopolitical, and other considerations, one cannot have any confidence in conclusions about this region.

Nonetheless, the following thoughts may be ventured.

Africa is just starting to experience the national conflicts and the phase of formation of nations through which Europe has been passing since the Middle Ages, and especially since the French Revolution. White domination in Rhodesia will be ended by bloody uprisings, resulting in the extermination and expulsion of the white race. The Portuguese colonies (Mozambique and Angola) will become independent states. French Somalia will be united with Somalia, and in South Africa, cooperation between whites and blacks will finally develop with the abolition of segregation and the establishment of legal equality.

The Arab world will experience some unexpected changes. Mutual conflicts and struggles will bury the myth of the Arab nation. The territory inhabited mainly by Arabs will be clustered around the three principal centers—Cairo, Algiers, and Jidda. The entire Arabian peninsula will be under Jidda, with Yemen, Jordan, the Sheikhdoms, and Kuwait disappearing as independent states. Syria and Iraq will be united. The Kurds will obtain autonomy within the framework of a mighty Persian state. Israel will preserve its independence and will play a very significant cultural and economic role. Egypt and the Sudan will join in a federation. Libya will be divided between Egypt and the western Arabs centered around Algeria. Mauritania and Spanish Sahara will also disappear as independent territories. Algeria will then extend its power over Tunisia and Morocco, uniting with them in a federation.

In general, there will be a continuation of the trends that already today are discernible. The permanent technical revolution, which will alter communications and the way of life, will make the earth's globe a "village," but one in which each clan jealously guards the borders of its being.

Milovan Djilas, former head of the Yugoslavian Parliament and vice-president of Yugoslavia, was expelled from the Communist party in 1954 and imprisoned from 1956 to 1961. He has written widely about Communist and Socialist theories.

2. Emmet John Hughes:

In the year 1900 Finley Peter Dunne's "Mr. Dooley" greeted the new century with his salvo of aphorisms that included the deadly definition: "A fanatic is a man that does what he thinks th' Lord wud do if He knew th' facts iv th' case." In the year 1974 the political prophet presuming to scan the next half-century looms as a card-carrying oracle no less pretentious and abrasive. But to proceed with the impudence . . .

I have reviewed the scattered array of hunches that each of us likes to fancy as his disciplined sense of history, and I find only three tolerably believable premises about global things to come. First, the thrust of nationalism, which so many sages thought had almost spent itself by the end of World War II, will continue to outrun all expert expectations, especially as it is reinforced by the fresh passions of the newly independent nations. Second, the force of ideology, as a guide to the conduct of nations, will continue to falter and become more feeble and irrelevant. As the dilemmas and distresses troubling the majority of peoples appear ever more insistently both practical and universal, they leave less and less place for the divisive role of the theoretical. The most inventive designs for reversing urban decay or slowing population growth—or curbing inflationary pressures or surviving energy crises—may be infinitely varied. But it will become increasingly implausible to label any one of them as democratic or Communist or Fascist. Third, for these and related reasons, the line most seriously scarring the globe will be seen to run, not between East and West, but between North and South, between those societies that have perhaps enjoyed too much and those that still enjoy next to nothing, and between the most industrialized nations and the most industry-hungry nations, oddly blessed by the natural resources with which industry itself must be fed. And the lesson of what the Arab countries have done with oil certainly will not be lost on sovereignties whose weapons are copper, tin, or bauxite.

A more sweeping and more uncertain generalization might be added: the signs of foreseeable ferment and conflict appear more clear *within* nations than *between* nations. In Latin America the instability of both government and society in most nations seems almost assured by the pressures of population growth and popular expectations, but there is no yet-perceivable logic to translate these internal stresses into the kind of external adventures that erase national

frontiers. In the Mediterranean world, the governing of Spain or Italy or Yugoslavia cannot much longer go on as in the past, but there seems no cause to infer from this chronic uncertainty any historic clash among these powers. And with regard to the Soviet Union, a bloody and memorable struggle for individual freedoms may well be inescapable, but I remain skeptical of the forecasts of those scholars who, clinically or wishfully, cite such a struggle as proof that Soviet frontiers—or Soviet power—are therefore due for retreat.

Where and how, then, will those brightly colored lines on the map move in the next five decades? I do not entertain any fantasy about frozen frontiers. But I must confess to suspecting three arenas of world power where I can anticipate—*almost* confidently—no historic changes. (1) There will be *no* Atlantic Community fusing the sovereignties of the United States and Great Britain. The future of London lies with Paris and Bonn and Rome. And the fancy of union with the old colonies amounts to a vision of a fifty-first state of the Union, as submerged in the American constellation as Hawaii. (2) There will be *no* rising of the "satellite" states of Eastern Europe against the Soviet Union that can today sensibly be projected. There may be groans, polemics, and even screams—but a continuing political coherence. (3) There is *no* plausible reason to expect the Sino-Soviet conflict to explode into total war. The ideological wrangling will go on, of course, with less and less pertinence to anything in particular. The frontier incidents will recur and escalate. But neither great power will find the incentive to commit itself to the other's destruction.

I think we therefore have to look elsewhere to forewarn the cartographers of the future. Specifically—and with renewed impudence . . .

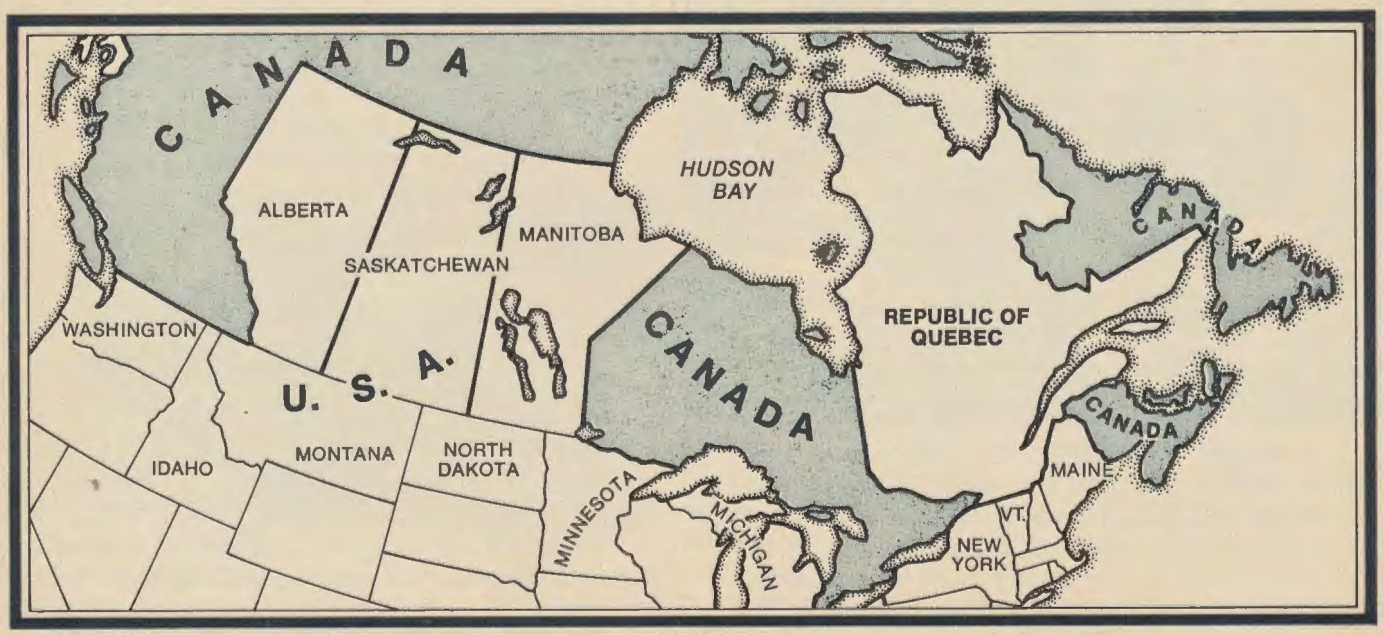
• Asia. Here, most oddly, the omens seem clearest. For one thing, the unification of both Vietnam and Korea may, I believe, stand as presumed—under Communist leadership in both instances. (With respect to Vietnam, of course, this will provide the definitive retort to official American rhetoric about "peace with honor" in Southeast Asia.) At the other end of the Asian political spectrum, the avowedly democratic society of India may reasonably be counted upon, not to unify, but to fragment—possibly into as many parts as Western Europe. All the while, the People's Republic of China, after rather quickly digesting Taiwan *and* the fable of Nationalist China, may be counted on to push southward, where it will extend effective but nameless sovereignty, discreetly but stubbornly, over most other feigned sovereignties in the area. Or as a distinguished veteran of our Foreign Service recently reminded me: "It isn't all called the China Sea for nothing."

• Europe. In the west the economic exigencies within the several nations may be expected to prevail over patriotic sentiments to foster some kind of "concert" of international actions. Whatever political form this eventually takes, however, it will end at the existing frontier between West and East Germany—a division at least partly rooted in history for many generations before Yalta and Potsdam.

• Africa—and Europe. In this arena, the internal stresses of the Mediterranean countries have lately been displayed most dramatically with the social and fiscal chaos of Italy—once the economic wonder of the post–World War II world. Out of these stresses, there may well be born a new form of nineteenth-century imperialism, almost evangelically proclaiming its refusal to be subject to political or economic "blackmail" by the oil-rich or mineral-rich regions of the Middle East and Africa. The ensuing European intrusions may well be imitations of the "satellite" system to which the Soviet Union introduced the Western world with such examples of specious autonomy as Poland or Czechoslovakia. And the historic sum of European presence in these realms of sand and oil could strikingly resemble the sly and quiet trespassing of the Chinese to *their* south.

• North America. It is conceivable that here, where rude redrawing of national boundaries seems least probable, a new etching of frontiers might indeed take place. Over the next 50 years, the odds are not overwhelmingly against a French secession from Canada, spurred by the passions of Quebec province. In that event, could the province of Ontario control the impulses of Canada's prairie provinces toward union with the United States? Quite plausibly, the answer is negative, and the prospect would be a new map of this peaceable continent.

(Continued on page 30.)



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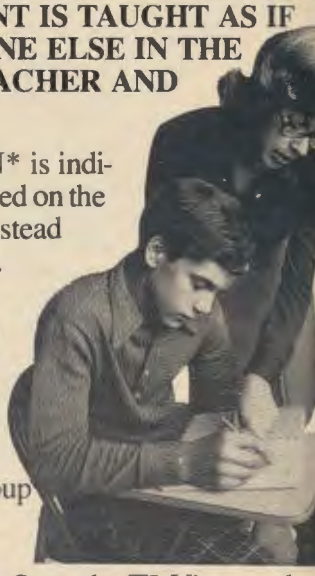

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(World Atlas: *from page 27.)*

And so—by way of this cloudy clairvoyance—a few conclusions may follow.

One: I do not view with much optimism the aggregate power of the Western democracies. Rather do I scan the long-term prospects of the Soviet Union —from mineral resources to political possibilities—with a kind of anxious concern.

Two: I do not much like the curves of the national frontiers that seem to be coming. These borders appear rather fixed in the Communist sphere, rather flaccid in the democratic sphere. And the consequences could be costly.

Three: I do not have great faith in the power of the Western democracies to resist the twin temptations of authoritarian rule at home and imperial rule abroad. To say the same thing a little differently: the prospects for the *old* free peoples and the *new* free peoples do not look altogether unalike.

I recognize that the sum of this sounds like more of the old historical same. So be it. I cannot join with Lord Tennyson as he "dipt into the future, far as human eye could see" to glimpse a vision of "the Parliament of Man, the Federation of the world." With regret, I must stay with Lord Byron and his more cool counsel: "The best of prophets of the future is the past."

For 20 years a Time-Life *foreign correspondent, Emmet John Hughes was a campaign speech writer and administrative assistant for Dwight D. Eisenhower. He is professor of politics at Rutgers University, columnist for* Newsweek, *and author of* The Living Presidency.

3. Lord Trevelyan:

I shall limit my speculations to some of the areas in which I have spent my working life: the old India, China, the Soviet Union, and the Middle East.

First, India. Will it split up, apart from the severance of Pakistan, into the independent states that would probably have been created if the British occupation had not unified it? I think it will just hang together. Aside from the boundaries with Pakistan and Bangladesh, it is fenced in by the sea and the Himalayas. The 150 years of British rule have bound its separate parts together by common legal and political traditions, a unified economy, and a common struggle for independence.

The south might have gone its own way if there had not been some compromise on the use of the English language and if the British policy favoring the so-called fighting races of the north had not left this relatively peaceful region one of the militarily weakest provinces of British India.

The Sikhs might have recreated their old independent kingdom if delay in the date of independence had reduced the country to chaos and enabled them to gain control over Sindh, and thus access to the sea. But the moment passed. The centrifugal forces are strong but are not likely to break up the Indian Federation, provided the central government continues to make such divisions in the units as are required by sectional pressures.

Bangladesh has nowhere else to go. With its predominantly Muslim population, it will not join India. The old argument about the partition of Bengal is surely now settled and will not be revived. Moreover, those who have power are not likely to give it up. The survival of Pakistan as one entity is more problematical. The Pakistanis always said that their own unity in the West would be in question if the East broke away.

Will the Pathans of the northwest frontier and Baluchistan join their kinsmen in Afghanistan and desert the alien Punjabis and Sindhis? They might, but I fancy that the economic advantages of remaining part of Pakistan and the fear of getting too near the Soviet Union will restrain them.

Next, China. I take it as certain that Taiwan, Hong Kong, and Macao will revert to the government of the mainland. I do not believe that the Chinese will want new territories in Southeast Asia, whatever their historical claims. They will be content with influence. They are not likely to want to change their present boundaries with India, which I believe to be historically justified and which give them what they want—a secure road between Sinkiang and Tibet and a commanding position in the northeast on the southern slopes of the Himalayas. Nor will India be able to dislodge them.

I see no reason why China should want to swallow either North or South Korea, unless that is the only way of preventing one or the other from coming under the effective control of the Soviet Union or Japan; and it will not be in the interest of either of those great powers to attempt to gain such control.

I do not expect war between the Soviet Union and China, which would be disastrous for both. Nor do I believe that the Chinese will be able, under the conditions of the nuclear world, either to pursue their claims to the areas of the Soviet Union north of the Amur and Ussuri rivers, which they consider to have been stolen from them by the Czars, or to obtain reintegration with Mongolia, nominally independent, but part of the Soviet eastern defense system.

I pass to the Soviet Union. Will it incorporate any of the smaller countries in Eastern Europe into the Union? It will not be necessary. A basic Soviet policy is to preserve the European frontiers while maintaining a strong grip on Eastern Europe by the use or threatened use of Soviet forces. To acquire new Eastern European territories would be to revert to the old-fashioned form of empire, which would discredit Soviet communism. The present Soviet domination of Eastern Europe—given the Brezhnev doctrine—satisfies Moscow's security re-

quirements without any renunciation of Communist principles.

Will the Soviet party allow any state of the Union to secede in accordance with Lenin's original doctrine? Surely not. Mr. Brezhnev recently said that the party would not tolerate any manifestation of nationalism and that the successful development of the Socialist community as a whole would continue to be the main prerequisite for the effectiveness of Soviet "class-international" policy. That is clear enough, and there is no reason to suppose that Soviet power will fail to maintain the system, including the continuation of the separation of West and East Germany and the existing western frontier of European communism.

In the Middle East the situation is much more volatile. Arab unity is a dream that will not come true. I see no reason why the states of the North African littoral should not keep their present boundaries, but changes are more likely in the Asian part of the Arab world.

Let me speculate wildly: Israel will keep the Straits of Tiran, the Gaza Strip, most of the Golan Heights, and Jerusalem save for an international regime in the holy places; a new Palestinian state will be created on the west bank of the Jordan on Israeli sufferance; though Jordan will be in danger from Syria when King Hussein dies, it will just survive with the help of those, including some Arab states, that do not want to see Syrian expansion; Iraq will finally succeed in swallowing Kuwait; Bahrain and Qatar will be absorbed into Saudi Arabia; there will be an independent state formed by the Emirates of the Gulf joined with Oman, which will be kept in existence because of the opposed pressures between Saudi Arabia and Iran; the two states of Yemen will, in the end, come together. But, alas, I fear that whatever the eventual picture, there will be much disturbance in the Asian-Arab states before 2024 arrives.

Lord Trevelyan, former British ambassador to Egypt, Iraq, and the U.S.S.R. and high commissioner in Aden, is the author of Middle East in Revolution.

4. Kei Wakaizumi:

A dozen factors are among the important determinants of political boundaries. By projecting how maps based on these factors will change in the next 50 years, we can develop a more realistic, if also more complicated, view of the relations among countries.

(1) Military power. Still the most important single variable determining boundaries. Two simple maps would be useful: one showing the total military expenditures and a second showing nuclear-warfare capacity and/or the potential to develop it.

(2) Economic position. Maps showing GNPs and per-capita incomes would be indicative. For example, today's maps of GNPs would show the United States, the U.S.S.R., Western Europe, and Japan as huge; China and India as relatively small; and most Asian, African, and Latin American nations as quite small.

(3) Population. With China and India, Asia is already the earth's most populous area. The projected growth of Asian nations will be a tremendously important political factor in the future.

(4) Food. One map should show the total production of foodstuffs and another, the sufficiency, per person, of that production.

(5) Natural resources. The maps should reflect both the present production of various minerals and the remaining deposits.

(6) Energy resources. The maps would need to show the availability of fossil fuels, nuclear energy, solar energy, et cetera. This factor relates closely to:

(7) Scientific and technological resources. The development and mapping of these relates, in turn, to:

(8) Education. This variable involves not only the degree of literacy but also the degree of higher education and of the use of mass-media communications. Television, for instance, may have a social impact analogous to the invention of printing.

The following factors are of a somewhat different character. They reflect

(Continued on page 116.)

Out of This World

Underground lunar colonies, a touchdown on Titan, surgical procedures for explorers bound for Jupiter and Saturn are on the planning boards for tomorrow.

by Neil A. Armstrong

After more than 50 years of exploring the moon, every crater, rill, nook, and cranny of any interest at all will have been visited and revisited. Lunar exploration will be limited to the scientific specialist and indefatigable prospector and rock hound. Exploitation will have superseded exploration. Mining, manufacturing, and special services will be the principal business of the colonies and will provide the majority of jobs for the inhabitants.

Inhabitants? Certainly. Permanent? Perhaps. But most individuals will be on a temporary assignment. Perhaps a two-year contract, fringe benefits, and all expenses, with a bonus for a renewal after a two-month paid vacation back home on the earth.

The lunar colonies will be underground, protected from the temperature extremes of the fierce sun of the lunar daylight (250° F.) and the black cold of the night (−200° F.). The length of the lunar day (high noon to high noon) is more than 700 hours, but underground the days will be maintained at 24 hours, requiring a minimum of adaptation time for the rocket-lag-plagued new arrival.

A typical lunar colony (e.g., Hillsburrow) will consist of a number of underground apartments and workrooms connected by tunnels. As the moon has no atmosphere, all habitable spaces will have to be pressurized with air or a breathable mixture of oxygen and other gases. Extreme care will be taken to prevent air leakage, and pressure-sealing doors throughout will isolate any room with a suspected leak.

Spherical- and cylindrical-shaped spaces are preferable for pressurized compartments, and they provide multiple-story living and working areas. Stairways will not be used because of their poor volumetric efficiency. In the weak lunar gravity, many people will simply jump from one floor to the next, needing only an occasional handgrip to maintain balance. Ladders or cable elevators will be provided for those who are less agile or are carrying heavy loads.

It is conceivable that one day man may want to build an atmosphere on the moon to avoid the necessity for these safeguards against the inconveniences of living so near a vacuum. For the present, however, the vacuum is one of man's best reasons for being on Luna. The handy, high-quality vacuum, along with the ready availability of both very low and very high temperatures (using a simple solar furnace), makes possible the manufacturing of high-purity metals, vacuum-cast alloys, and specialized electronics components superior in quality and less expensive than their best competitors on the earth.

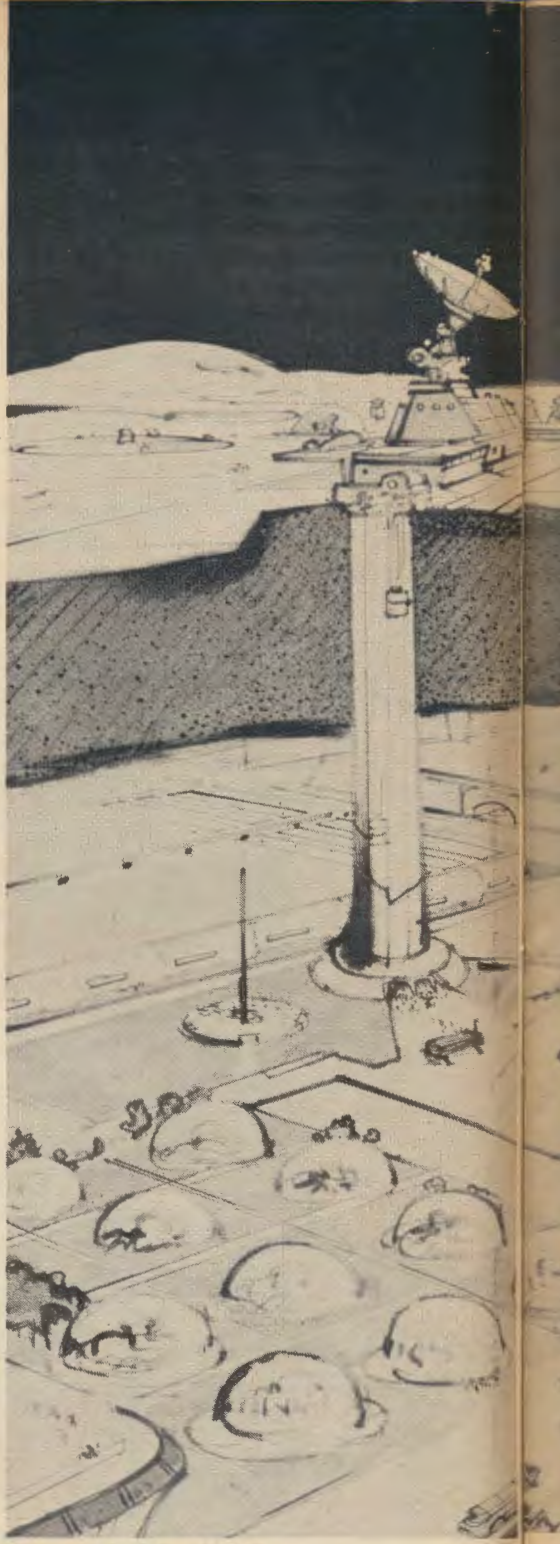
For centuries it has been known that the moon rotates about its axis at essentially the same rate as it revolves about the earth in its monthly orbit; consequently, it always presents the same face toward the earth. For the lunar colonist living on that face, therefore, the earth does not rise in the east and set in the west, but rather, it remains nearly motionless, a beautiful, blue, slowly spinning orb, forever locked in the same position in the sky overhead.

Aside from providing a certain sense of security, this characteristic has a very useful feature. A directional radio antenna can be pointed toward the earth and locked in place: it need not be movable as it would have to be if it were to track a planet moving across the sky (as the moon moves from the earth's viewpoint).

The far side of the moon has, of course, no such advantage. Communications will be relayed, however, by way of a satellite orbiting about the moon.

This disadvantage of the far side—of never being able to enjoy the beauty of the earth overhead—is compensated, to a certain extent, by a very important advantage.

Radio receivers located on the far side are unable to receive transmissions from the earth (except, of course, by the satellite relay). They can hear neither the intentional transmission (AM, FM, PTM, PCM, LF, HF, VHF, et cetera) nor the unintentional (static, signals



Illustrations by Robert McCall

An Underground City on the Moon—

With the NASA program for 17 years, Neil A. Armstrong was the first man to walk on the moon. He is now a professor of aerospace engineering at the University of Cincinnati and lives on his farm nearby.

"In the weak lunar gravity, many people will simply jump from one floor to the next, needing only an occasional handgrip."

generated by lightning, electric motors and generators, manufacturing operations, and so forth).

Who would want to escape this cacophony of man and nature? The person who wants to listen to the unadulterated transmissions from outer space: the radio astronomer. Hence the radio telescopes and X-ray telescopes (for similar reasons) will be among the first permanent installations on the lunar far side. Their dish-shaped antennae will fit very nicely into natural craters, providing ready-made structural bases.

The natural craters will be useful in other ways. For example, deep craters near the lunar poles will be in continuous shadow. Forever untouched by the warming rays of sunlight, such locations are extremely cold—near absolute zero. Such places would be ideal low-temperature laboratories, far better than any such places on earth, and among the best such places in the entire solar system. Here the "cold" scientists will be able to investigate that fascinating point where molecular motion nearly stops, where electrical properties of materials take on an entirely new character, where the relation between matter and energy takes on a whole new meaning.

In these remote outposts, and in colonies like Hillsburrow, conservation will

Base on Mars—*The more impractical the goal, the more intense the fascination.*

be a way of life. "Waste not, want not" will be a mandate rather than a slogan. Most important will be those elements not naturally available on the moon. Paradoxically, hydrogen, the most abundant element in the universe, is unavailable. As is carbon. No hydrogen and carbon: no water, food, fuel lubricants, plants. Oxygen, on the other hand, is a constituent of many lunar rocks and can be obtained as a by-product of the processing of the lunar ores.

Lunar agriculture, to provide a percentage of non-synthetic foods (and an occasional flower), will be performed underground under artificial lights. In the growing rooms, the temperature, humidity, and lighting will be maintained at optimum growing conditions. The amount of power required is far less than that necessary to condition natural-sunlight "greenhouses" on the surface. All plants will be grown in trays filled with a modified lunar soil and fed with a nutrient solution with semi-hydroponic techniques. Livestock will not be included because of their low food-producing efficiency.

The power for all operations will be electricity. Giant solar generators will convert sunlight to electricity. Some of the power will be used to spin large flywheels to incredibly high speed, accumulating the power necessary to drive generators during the long lunar night.

The lunar inhabitants as well as the colonists on other planets and planetoids will not have left the earth for purposes of solving our population problems. No practical method of transporting large quantities of people and goods is likely to be devised in this century or the next. But the new frontiers, the new challenges, and the new opportunities away from our home planet will amount to a freeing of our civilization from its prison of inevitability.

We always face the possibility, however remote, of a worldwide catastrophe. Both man-made and natural disasters that would completely destroy the human race can readily be hypothesized. A number of observers have noted the survival value of an extraterrestrial colony that would prevent the extinction of the race in such an event.

OUR CIVILIZATION has not yet matured to the point of being able to select its long-range goals. Once we have decided whether our ultimate purpose is to preserve our species; to evolve to a higher form; or like the majority of the other animate species before us—the dinosaur, the mammoth, and the passenger pigeon —to disappear from the face of the earth, we will be much better able to know whether our fascination with the universe around us is a principal ingredient of our destiny.

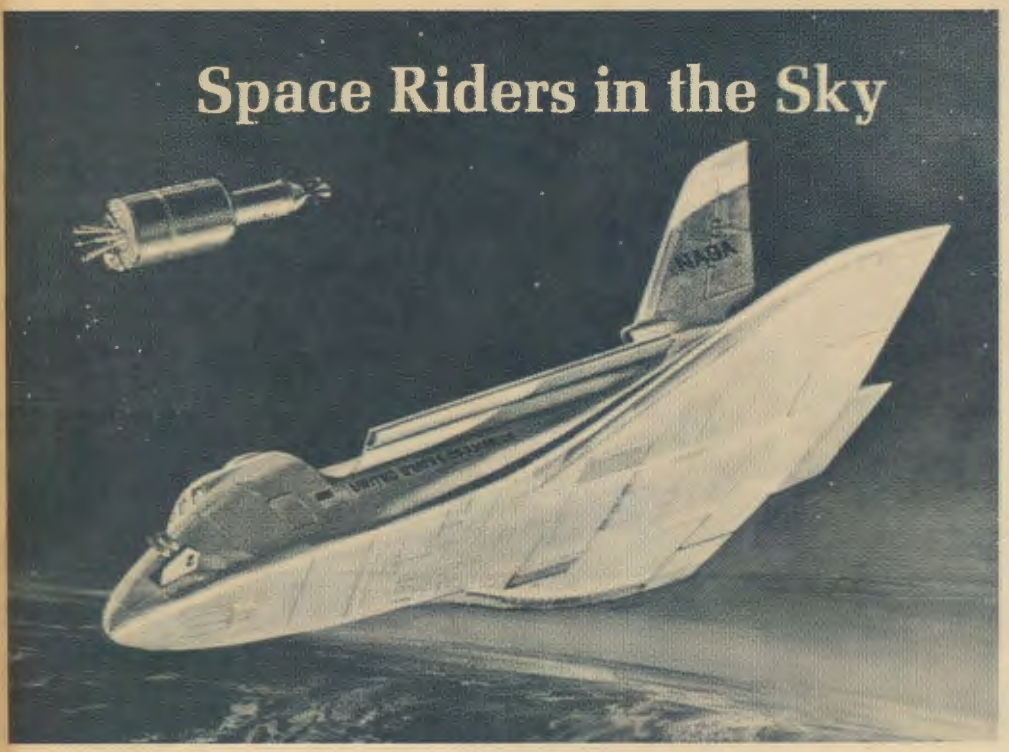
Although the only extraterrestrial colonies in existence in 2024 will be on the moon, man will certainly have visited other celestial bodies, probably Mars and a few carefully selected asteroids. Our interest, 50 years hence, will be in devising ways of reaching those places previously thought to be completely unsuitable for man.

Mercury, Venus, Jupiter, Saturn. Unmanned instrumented probes will have visited all these places and sent back pictures and measurements of their physical, chemical, and even biological characteristics. But these data will merely whet the appetite of man. He must go and see and touch. He must experience both the motion and the emotion. And the more seemingly impracticable the goal, the more intense the fascination.

In 2024 such a fascination will exist with Titan, the largest of Saturn's moons. Three-quarters of a billion miles from the earth and nearly as large as Mars, Titan is nearly a planet in its own right. Its surface area is two-thirds the size of the land area of the earth. It has usually been considered inhospitable, not only because of its extreme distance from the sun and its consequently low (−250° F.)

(Continued on page 118.)

Space Riders in the Sky



Illustrations courtesy NASA

Oil prospectors, astronomers, and climatologists will cruise the heavens. A life without spacecraft may be as hard to imagine as one without planes or phones.

by Wernher von Braun

It is safe to predict that fifty years from now, people will look back and wonder how man ever managed his affairs on his limited planetary abode without the tools provided by the space program. That there could ever have been a world without spacecraft will be just as difficult for them to imagine as one without telephones and airlines is for us.

In 2024 mankind will be faced with many problems that can only be tackled successfully by a global, coordinated systems approach. Successful solutions to these problems will require continuous monitoring and surveying of the entire earth, supported by an effective communications system capable of transmitting the large quantities of collected data and pictorial information in real time to a multitude of users in almost one hundred nations. Unmanned earth survey and communications satellites and orbiting manned observatories will form the backbone of this system.

The dominating problems of humanity during the next fifty years that will require such aid from space will arise from the collision between man's happy-go-lucky joy ride of unrestrained and unlimited growth—both in numbers of people and their material expectations—and the grim limitations of resources the earth can provide and of wastes it can absorb.

Some of these problems are already upon us today. The sudden shortage in fuel oil and gasoline made us shockingly aware of our dependence on resources that for too long we have taken for granted. We would be tragically mistaken if we took our present energy crisis as an isolated incident—brought about by mischievous Arabs or profit-hungry oil moguls—as a problem of a temporary nature that will soon be resolved. We should rather accept it as a timely and deadly serious storm warning. Not only is our automotive joy ride over (a ride made possible only by a hitherto unlimited supply of cheap energy from oil), but also we will have to learn to utilize more intelligently our planet's scarce remaining resources in metal ores and its limited ability to produce food crops for its exploding population.

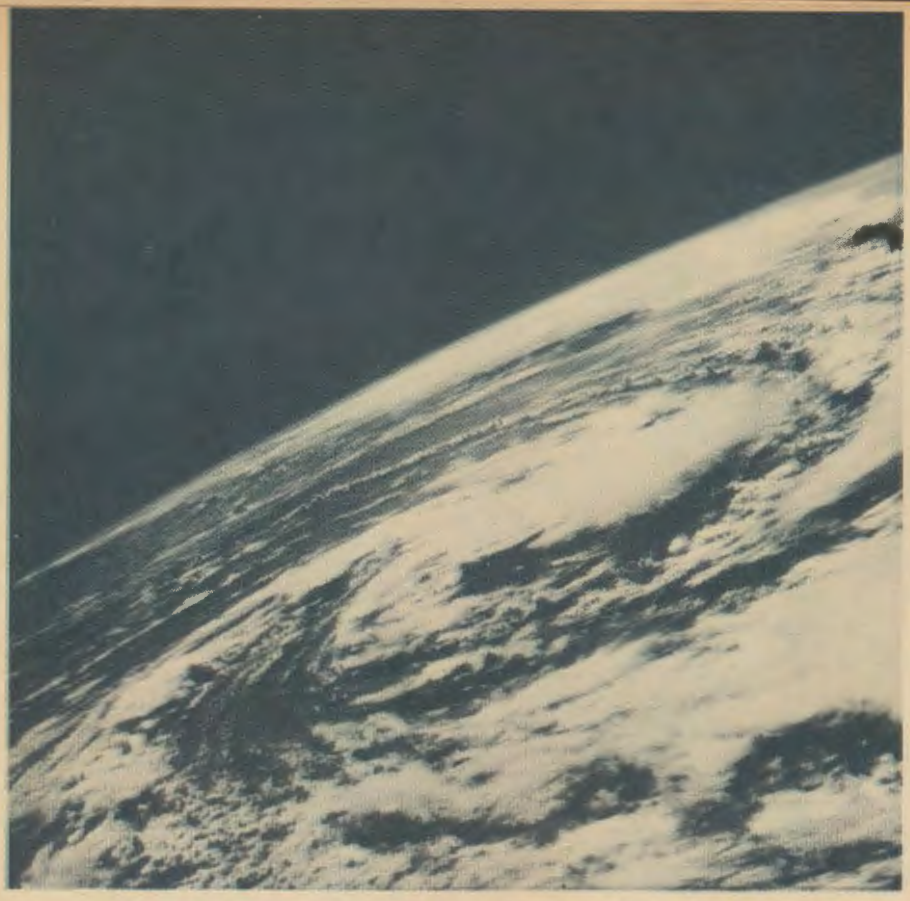
During the Seventies, Eighties, and Nineties, a worldwide satellite search will be initiated for additional deposits of metal ores, coal, oil, shale, and natural gas. Using multi-spectral scanners and other sophisticated optical devices, the orbital prospectors will collect picture material that, by comparison with known ore or fossil-fuel deposits, can point out promising sites for closer scrutiny by ground crews. "Side-looking" orbital radars, with "synthetic apertures" (radars so designed that their own orbital movement produces the effect of larger antennas than they really have), will conduct these surveys even through permanent overcast and at night.

The satellite search for non-renewable resources will be combined with a continuing survey of cyclically renewable resources, such as the yearly food and fabric crops and the thirty-year cutting and reforestation cycle of timberland. Ever since ERTS-1, our first Earth Resources Technology Satellite, demonstrated in 1972 its uncanny ability to distinguish, from orbit, the subtle differences between the spectral reflectivities of different crops, this orbital fact-gathering technique has been perfected beyond the fondest expectations. By the turn of the century, resource satellites will be collecting, as a matter of routine, precise global data on the local and worldwide yield of such food crops as corn, wheat, rye, barley, rice, and soybeans, and of fiber crops like cotton and sisal. As a fleet of these satellites circle the earth in their low, near-polar orbits, they will enable the data centers on the ground continually to update their crop predictions. For instance, wherever the sensors of a satellite detect a region where previously unspoiled fields had suffered from flood, drought, hailstorm, or insect infestation, the "update" will enable the data center to correct its previous estimate.

The same satellites will also produce a continuing record of the pattern of worldwide human habitation. Built-up urban areas, characteristically lacking the chlorophyll-signature of vegetation, will stand out like sore thumbs on the satellite-produced earth pictures.

Thus the satellites will provide the two

A native of Germany, Dr. von Braun worked on rocket development culminating in the V-2. In the U.S. after the war, he directed programs for NASA resulting in the manned lunar landing program. He is now a vice-president of Fairchild Industries.



Hurricane Gladys Seen From *Apollo 7*—*"Satellites will provide a two-week weather forecast. . . . It is also safe to predict some degree of weather control."*

key pieces of quantitative information required for a badly needed worldwide food-supply management system:

- Where is the food, and how much of it will be available for consumption? ("supply")
- Where on earth are all those hungry mouths that must be fed? ("demand")

The big computers in the resource data centers then can figure out what options are available to the world economy to satisfy the regional calorie and protein requirements and to stave off mass starvation in regions of critical crop failure.

In addition to their usefulness with short-term problems, however, the earth-looking satellites will also provide man with a deeper understanding of many of the long-term implications of his industrial civilization. For instance, they can settle the old controversy as to whether the earth as a planet is gradually getting warmer because of the "greenhouse" effect created by the great amounts of carbon dioxide released into the atmosphere through man's massive burning of fossil fuels, or whether the opposite is true, that it is actually getting colder because those same offensive smokestacks and exhaust pipes increase the average cloudiness and thus reduce the percentage of sunlight reaching the earth's surface.

The concern is well founded. In the former case even a few degrees' rise in the earth's average temperature would suffice to melt, within a few hundred years, the ice caps and glaciers in the Arctic and Antarctic regions. As a result, the ocean level would rise about fifty feet, inundating all of the world's coastal cities. In the latter case, our industrial activities might trigger another Ice Age, with equally disastrous consequences. The answer (which the author's crystal ball refuses to yield) will be found by carefully measuring from orbit, over a period of many years, the minute changes in the earth's albedo, or percentage of sunlight reflected back into outer space.

Another problem of potentially grave long-term consequences is the pollution of the continental shelves. The shelves comprise only 3 percent of the total ocean area; but as they extend only to depths of a few hundred feet, which sunlight can still penetrate, they provide the abode for the bulk of all photosynthesis-supported marine plant life. Because marine animals feed, directly or indirectly, on this plant life, the continental shelves actually support much of the life at sea.

The problem now is that many of the world's polluted rivers do not really flow into the wide-open oceans, but rather onto the continental shelves. What makes it even worse is that the steady sea breezes drive the dirty river waters back to shore and thus often pollute hundreds of miles of shelf to the right and left of the estuary. The global environmental effects of this extended pollution of the shelves are virtually unknown. Some scientists are concerned that one effect may be a slow but substantial reduction of the oxygen content of our atmosphere. They believe that the ocean's plankton (which is affected by the health of the shelves) accounts for possibly as much as 50 percent of all oxygen regeneration out of carbon dioxide, with only the other 50 percent being regenerated by land vegetation.

Again, the satellites will provide the answer. By a systematic study, over several years, of the shelf-pollution pattern caused by the earth's rivers, they can provide a data base on which corrective action could be taken. In many cases the river cleanup measures ordered by national or regional environmental protection agencies may prove to have been adequate or could be tightened sufficiently for restoring a shelf's ecological health. In more difficult cases, massive engineering projects can be initiated to virtually channel, or pipe, the poisoned river waters across the continental shelves to the near-barren deep-water ocean areas.

Even the open oceans can be held under continuous scrutiny. Whenever a tanker captain in 2024 thinks that he can get away with cleaning his bilges or bunker spaces on the high seas under protection of night, the satellites, detecting both the telltale oil slick and the ship steaming away from the scene, would quickly report the misdeed to the U.N. pollution-control branch, and the shipping company could expect to be fined for violation of worldwide treaties on environmental protection.

Atmospheric pollution could also be a subject of continuous monitoring by the ever-watchful eyes in the sky. The worldwide machinery of environmental protection would be promptly notified whenever pollution levels dangerous to human health were approached.

Thus, the years between 1974 and 2024 may give us what Spaceship Earth needs most: a capability of doing some sound "planetary systems engineering." These 50 years will provide us for the first time with a planetary data bank, and the orbit-collected data stored in this bank will provide the basis for at least some rudimentary "planetary systems management."

Will the "planetary system management" of 2024 be tantamount to "world government"? Not necessarily. Many people today are concerned that

(Continued on page 120.)

How to Fly, Japanese Style.

Slip into a *happi* coat. Part robe, part sport coat. The Japanese dress up even to relax.
JAL's flight kit includes slippers, fan, city guide, toothbrush, travel wallet —and eyeshades!
Sake, champagne, wine. And a platter of cheese to snack from in between.
Hot *oshibori* towels. Or, how to freshen up without getting up.
Kobe. The world's most tender beef.
Tsukidashi. The delicious word for Japanese hors d'oeuvres.
Beluga caviar. Lobster. Pâté. When it's cocktail time on JAL, we treat you like a king.
Cuisine à la Japanese. A perfect introduction to Japan.
Artichoke hearts. Carrots aglow in butter. And the steak is cooked to order.

This photo features First Class service items.

We once asked some of our flight guests what they liked most about flying with us.

Surprisingly, it wasn't any of the comforts or delicacies above.

In fact, it wasn't what we did so much as how we did it.

They spoke of being pampered. Of the way our hostesses in kimono smile.

Small things, of course. But in a world that worships the mammoth, the small has a way of making up in gleam what it lacks in size.

At JAL, we glory in the small things of life. From our first hello to our last *sayonara,* we take the small attentions and courtesies so much for granted, they are our way of life.

It's a way of life practiced by us and our ancestors of generations beyond number.

In that sense, you could say we've been practicing how to fly for a thousand years and more.

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I'd like to fly Japanese style. Please send me your free booklet with all the details.

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City_____ State_____ Zip_____

My travel agent is_____

Please have a travel consultant call me at_____

We're getting 60 million barrels of oil this year from wells that once were running low.

Using modern recovery techniques, Texaco can now produce enough crude oil from old wells to make enough gasoline to keep a million cars running in 1974.

Years ago when a well began to run low, you had to give up on it.

But starting around 1950, Texaco began using special recovery techniques to force oil out of the rock formations that lie deep in the earth. And in recent years, these "secondary recovery" methods have become more and more important in increasing Texaco's reserves and production in the United States.

Using techniques like water flooding, we pump water into the ground to bring up oil that would otherwise remain buried and useless.

Gas injection, another recovery technique, maintains pressure in the well and helps to increase oil recovery.

Still another recovery method is steam injection. Steam heats up the oil, thins it out, makes it flow easier. In this way, we get oil that couldn't be gotten before.

These techniques now account for over 20% of all the oil we'll produce this year right here in this country.

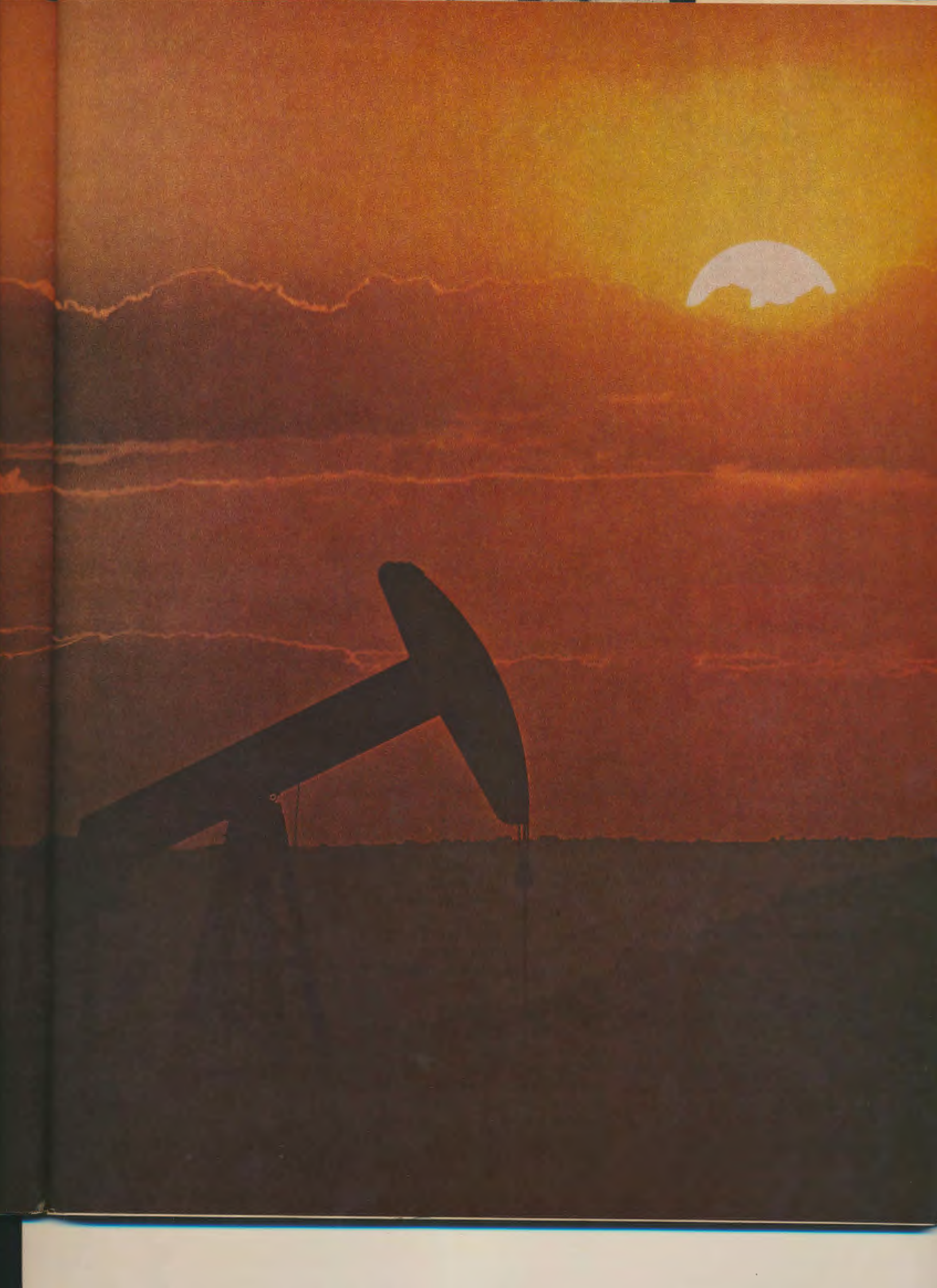
That's 60 million barrels of crude oil – over a billion gallons of gasoline in 1974.

That's enough gasoline to keep over a million American drivers happy for a year.

America needs energy. We're working to see that you get it.

TEXACO

We're working to keep your trust.



The Mercedes-Benz 450SE. Will the others ever catch up?

©Mercedes-Benz 1974

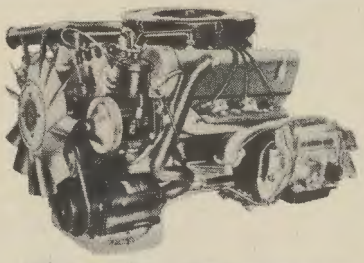
Mercedes-Benz has always engineered automobiles which are ahead of their time. Many of the concepts that put these automobiles ahead were pioneered by Mercedes-Benz over 20 years ago. They are still not found in any American sedan.

The 450SE has moved Mercedes-Benz even farther ahead. It has developed the basic systems of the automobile to greater heights than any other sedan in Mercedes-Benz history. Will the other manufacturers ever catch up? Read the following. Then decide for yourself.

Shape and size of the future

The 450SE looks as if it were designed in a wind tunnel, not a styling center. It was. Its aerodynamic design harnesses airflow instead of fighting it.

On the *outside*, the 450SE Sedan is not as big as a full-sized American car. The only thing big about this Mercedes-Benz is the amount of room *inside*. The 450SE is a five-passenger sedan with fully 20 cubic feet of trunk space. And its 25.4-gallon gas tank can give you about 400 miles of cruising range.



The engine of tomorrow

The engine in the 450SE is a sensible 276-cubic inch V-8. An overhead camshaft design featuring computerized, electronic fuel injection, this clean burning engine delivers good mileage without paying a performance penalty. An engine others will strive for tomorrow—available in the 450SE today.

The best handling Mercedes-Benz Sedan ever

It's almost unfair to compare a 450SE's handling with a domestic sedan's. Each wheel on a 450SE is suspended separately. So, unlike *all* domestic sedans which continue to have the same basic wagon-type rear axle they have had for decades, the suspension of a 450SE is fully independent.

Mercedes-Benz goes to great expense and effort to initiate new suspension developments. They can spell the difference between accident and incident. Ahead of their time? Unfortunately, for other sedan owners, years ahead. Owners of the 450SE, however, can call on these developments right now, and every time they take the wheel.

Safety first

The structure of the 450SE is the latest in a series of Mercedes-Benz developments of the patented rigid passenger cell/deformable extremity construction. It is designed so that the front and rear extremities absorb force in the event of an impact, to help the passenger cell remain intact.

One final thought. Today, when more than ever everyone is searching for lasting value, a Mercedes-Benz 450SE makes good sense. After all, an automobile which is years ahead of the rest today is far more likely to hold its value while the others are trying to catch up tomorrow.

Mercedes-Benz

Engineered like no other car in the world.

Tightly confined between the gaseous and the solid states of matter, liquids are rare in the universe. The narrow range of temperatures within which H_2O is neither ice nor vapor makes water the rarest of the rare liquids, the diamond of cosmos. Water makes life possible, and its excessive scarcity brings death; on earth, our life reservoir is the ocean.

The Perils and Potentials of a Watery Planet

by Capt. Jacques Cousteau

The ocean cannot be dissociated from any of our problems. Though not always properly "billed," it is nonetheless a vital actor in the "production" of climate, storms, agriculture, health, war and peace, trade, leisure, and creative art. It is not merely a weather-regulating system and a source of food, cattle feed, fuel, and minerals. More generally, it absorbs vast quantities of the carbon dioxide generated by the combustion of fossil fuels, it releases a major part of the oxygen we breathe, and it acts as a powerful buffer to slow down or to avoid such calamities as quick variations in the sea level. Moreover, the human body is made up of much more water than all its components combined. A dehydrated human being would weigh little more than 30 pounds. Our flesh is composed of myriads of cells, each one of which contains a miniature ocean, less salty than today's ocean but comprising all the salts of the sea, probably the built-in heritage of our distant ancestry, when some mutating fish turned into reptiles and invaded the virgin land.

Life was born in the ocean, evolved in the ocean, then occupied land wherever water was available, and produced two top-of-the-line creatures, both as smart as they were physically vulnerable —the ancestors of the dolphin and of the human. Dolphins returned to the sea, where they enjoy almost the status of playboys.

A Painful Hangover. As far as humans are concerned, they have only very recently achieved the domination of nature, and they suddenly realize that the long and difficult conquest of the planet and the enthusiasm of victory have spread worldwide devastation and ruin. As recently as seven or eight generations ago, Western civilization triggered various kinds of explosions: more children, more food, more tonnage of goods, more energy —which created an exhilarating climate of pride, of overconfidence. The rapture of growth. But after such a great wild party, we are just awakening with a painful hangover, and all around us our home is littered with the sad remains of the "morning after." While we are slowly and painfully attempting to clean the place and to return to normal life, we realize that growth, at least in quantity, has limits, that our conventional resources can, and will soon, be exhausted, and that our very life depends on the quality of water.

Eating Our Capital. Today, the ocean is sick—very sick. To my best estimate, in the past 25 years overall productivity of sizable creatures (shrimp to whales) has decreased by 30 to 40 percent. Such a tragic situation is substantiated not only by undersea observation and photography but also by the analysis of the world fish catch: the global tonnage reached a ceiling in 1969 and has decreased slightly ever since, although there are more better-equipped fishing vessels, the captains of which have learned how to use the latest scientific findings about migrations. In fact, on their traditional grounds, ir three years (1969 to 1972) catches of cod

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Jacques Cousteau has filmed and written about almost every ocean. He is director of the Oceanographic Museum and Institute in Monaco.

decreased by 22 percent, of haddock by 42 percent, of herring by 64 percent. The only way that man could maintain the world's fish harvest above the asymptotic figure of 60 million tons was by searching restlessly for new grounds and by switching to species that had hitherto never been fished commercially. The whale population is today less than 10 percent of what it was at the turn of the century. Coral reefs are dying rapidly all around the world. On a number of popular beaches, a swimmer may be exposed to skin diseases or even to hepatitis.

THE PRICE TO PAY. The sickness of the ocean has its origins in our heredity: ignorance, superstition, thirst for individual power. The diagnosis points to unday's option for the coming 50 years is dramatic: either we will let the ocean die and mankind will die soon thereafter, or surgery will be performed successfully and our new relationship with the sea will bring about the dawn of a golden age, as early as the year 2024.

WORLD WEATHER CONTROL. Within 50 years, the oceans, if managed with imagination and care, could provide the clues to "weather-making," suppression of droughts and famines, and taming of tropical storms and tornadoes. A computerized, world "Weather-Production Center" would continuously receive two sets of data from two different fleets of satellites. The first fleet would give an accurate description of the existing weather, somewhat in the manner of present-day meteorological satellites. The other fleet would interrogate thousands of instrumental buoys scattered over all of the oceans and seas, thus gathering detailed measurements concerning the evaporation and condensation factors: humidity, temperature differences, currents, and winds. If rain was badly needed in a famine-threatened agricultural province, the computers, fed with all the necessary data, would recommend that evaporation of seawater should be accelerated or reduced in a corresponding area of the ocean. Special rockets could then be sent to the selected area of the sea. They would spread a molecular layer of harmless and biodegradable dye or oil on the surface. A few hours or days later, falling rain would avert a famine.

Down the Up Staircase—*Either we let the oceans die or surgery will be needed.*

controlled proliferation and growth, a disease of the cancer family. The cancer that plagues the ocean is *our* cancer. At this stage of emergency, the "drugs" used recently (such hallucinogens as "better living by owning more") have proved to be inoperative; major surgery is needed, although we have not yet decided to turn to surgery. The cancer operation will be painful; it will not include the use of nuclear weapons, but it will result in spectacular transfers of wealth and in radical changes in our living habits and our moral standards. To-

A BONANZA OF FOOD AND DRUGS. Farming the sea could provide 10 times the amount of food and proteins obtained today from the world's fishing industries. But the traditional entries into the marine biological pyramid offer very limited possibilities and will be abandoned. Most "commercial" fish, for example, are thriving at the third, fourth, and even sixth or seventh level of the life cycle, while on land the cow feeds directly on grass. This means that at least 10,000 tons of algae have to be consumed in order to produce one single ton of tuna meat. This compares very unfavorably with the 10-to-1 efficiency ratio of the cow, or with the 50-to-1 ratio of the whale. The dugong, or sea cow, is the only marine mammal that feeds directly on vegetables. It is likely that 50 years from now, the bulk of human food originating in the sea will be obtained by farming massive quantities of vegetable plankton to be fed to such land mammals as cows, pigs, or, more particularly, sheep.

The basic (primary) production of planktonic algae reads in the trillions of tons. The energy required for producing such masses of vegetables through photosynthesis is delivered by the sun to the upper layers of the sea, but the crop is limited by the very slow turnover of nutrients, such as nitrates and phosphates. Deep, cold waters are rich in nutrients. In certain regions "upwelling" currents bring these rich waters to the surface, automatically increasing the abundance of algae and fish. Artificial upwellings will be caused, and the productivity of the ocean will be improved substantially.

The marine world is physiologically extremely complex, and we are learning that fish and invertebrates produce a great variety of substances ranging from poisons to tranquilizers, antispasmodics, antibiotics, and antiseptic chemicals. These will serve as models for the development of families of synthetic drugs of great therapeutic value.

INEXHAUSTIBLE LIQUID MINES. The continental shelf can provide some sources of heavy metals from "placers," but recent advances in ocean exploration and geophysics have opened new avenues to the exploitation of minerals from

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Photographs by Cousteau Group Inc.

Research Mini-sub—*Farming the sea could provide 10 times today's ocean produce.*

the ocean. The famous "manganese nodules" that litter vast areas of the abyssal plains contain not only manganese but also iron, copper, nickel, and many other metals. These nodules are not the result of some mysterious phenomenon that occurred in a distant past; they are still being formed today. The recent theory of "plate tectonics," explaining the mechanism of continental drift, also indicates the most probable areas where mineral deposits are formed on the sea floor. The study of the "hot brines" of the Red Sea is also casting a new light on how the concentration of minerals from seawater naturally occurs. In the future, we will probably know how artificially to trigger such concentrations, so as to directly extract precious ores from inexhaustible liquid mines.

CLEAN ENERGY FROM THE SEA. Tides have already been successfully tapped for the production of clean energy in a pilot plant at the Rance River, in France. A total of about 100,000 megawatts could be produced along a similar scheme in the Northern Hemisphere. Even more promising, though, is the project for rationally taming the temperature differences between both surface and deep layers of the ocean in most of the tropical regions. The sea absorbs the heat from the sun and, thanks to the currents, acts as a natural concentrator of solar energy. A small experimental thermal plant actually produced electricity from the sea as early as 1929. Bigger and improved plants could generate, without any pollution, practically all the energy needed by a developing world provided that population and wastefulness are controlled.

AN ERA OF MARINE URBANISM. Efficient prevention of all pollutions would make it possible to revitalize the dying coral reefs and to create undersea "acclimatization parks." Artificial shorelines would be developed, as well as huge floating surfaces for cities, airports, industries, and leisure parks. Careful interventions in genetic processes would allow us greatly to enrich the overall vitality of the sea and, consequently, of the planet. On land, deserts would be progressively refertilized. Such goals are not dreams; they are definitely within reach during the next half-century.

SOCIAL DRIFT AND COMMUNICATION GAP. Only science and technology can help us cure what the misuse and abuse of the same science and technology has threatened. But, unfortunately, scientists have great difficulty in communicating with the public. Herman Kahn and other futurologists have described the divorce between the specialists of all kinds, including the executives of government and industry, and the people. The two categories of population are separated by their style of life, their sources of information, and even their language; scientists, as lawyers, are using a jargon that the man in the street does not understand.

The communication gap has its origin in many causes, among which is the lack of clear, simple education about the ocean and the life cycle to which we belong. Also, because information is often biased under the influence of interest groups in all countries today, the evaluation of the human impacts of such vital activities as nuclear plants, offshore drilling, and so on is always and exclusively made by the agency or by the company involved in the production. Obviously, independent and respected sources of evaluation are needed. Furthermore, research is funded today almost only if it fits the policy or the short-range plans of the government apparatus. This is especially true in the environmental protection field. The result is that people realize how little they know, and they feel frustrated. They no longer trust statements from the United Nations because they suspect that these are dictated by some majority of unconcerned states; they don't believe announcements made by government agencies, such as those comparing the impact of radioactive tests with that of the luminous dials of a wristwatch. They suspect the data from pollution analyses published by oil or power companies. They desperately miss the existence of a completely independent source of such information.

Independent bureaus of evaluation

(Continued on page 122.)

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The Medical Prognosis: Favorable, Treatable, Curable

We need not accept disease as inescapable human destiny. In the doctor's bag: computer medicine, artificial body parts, keys to psychiatric ills.

by Michael E. DeBakey, M.D.

"There are no such things as incurables," said Bernard Baruch. "There are only things for which man has not found a cure." A lifetime in medical practice, education, and research has convinced me, too, that we need not accept disease as an inescapable human destiny, despite our lack of information about many forms of human illness. If we are willing to invest the time, effort, and money, we can find not only cures but also causes of currently enigmatic illness, and once we have learned causes, we will have a basis for prevention. Although death may remain inevitable, it need not occur prematurely or be preceded by acute or protracted suffering.

It is human nature to wonder about the future and to imagine what the world will be like 50 or 100 years hence. Our dreams and aspirations for the future, however, need not be idle fantasies; they can, and often do, serve as an impetus for new inquiries and new discoveries. It is true, as Horace Walpole said, that "prognostics do not always prove prophecies," but a few predictions about the future of medicine can be made with relative safety, based, as they are, on a Janus-like look at the past and the future.

The organization and administration of the practice of medicine, for one thing, will be far more efficient than it is today, with more coordinated use of regional resources, facilities, and personnel. Primary, secondary, and tertiary health care will be organized in units specifically designed for these respective purposes so that the medical needs of the population will be met in a prescribed region for urban as well as suburban and rural groups. Primary units will serve that part of the population which needs immediate, but not specialized, care. Secondary units will be available for patients requiring hospitalization, for example, for general health problems. Finally, tertiary units, or highly sophisticated medical centers, will be used by patients referred for conditions that require special attention. Health-care delivery of high quality will thus be distributed in a step-wise fashion to all people without concern of cost, through an effective form of national health insurance. Citizens will be much better informed about the physiological functions and mechanisms of their bodies and, through a regular and continuing program of public-health education beginning at the primary school level, will more readily recognize premonitory signs of disturbances in health.

Just as many of today's routine methods of diagnosis and treatment were unimaginable 50 years ago, so the techniques of the twenty-first century seem only visionary today.

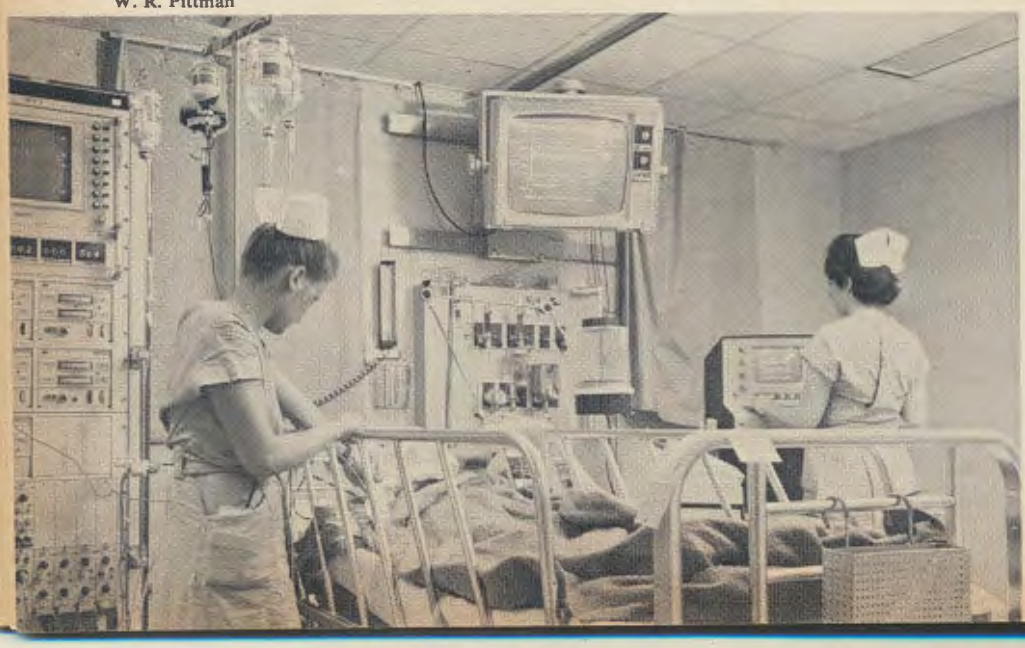
Replacement of bodily parts and organs, by cadaver or artificial substitutes, will continue to become more refined and more effective. Bio-engineers will probably design an implantable hearing aid for the deaf and will perfect an instrument to permit the blind to "see." Genetic engineering should result in the reduction, if not the elimination, of congenital deformities, and reconstructive surgery will be able to transform into normal-appearing human beings those few babies born with defects. Effective treatment, and eventually cure, can be expected for such crippling disorders as multiple sclerosis, muscular dystrophy, emphysema, and arthritis. The riddle of schizophrenia and psychosis will be unlocked. Considerable emphasis will be directed toward gerontological research; ways will be explored, and found, of making the elderly healthier, happier, and more productive.

As the public becomes better informed about the methods, the directions, and the benevolent purposes of medical research, a higher national priority will be ordered for this activity. The current skepticism and wariness that some display in regard to science, engendered partly by the intemperate publicity given to the relatively few exploiters and offenders and the exaggerated accounts of their misdeeds, will be replaced by confidence in the humanitarian purpose of scientists and by a renewed dedication to the conquest of human disease. Society will come to realize that the health of the nation's people mirrors the state of medical knowledge and will understand that no matter how efficient the *delivery* of health care becomes, its *effectiveness* will remain at a plateau until new knowledge is acquired—and this can be achieved only through research.

The fiscal wisdom will thus become

A pioneer in open-heart surgery, Dr. DeBakey is President and Chairman, Department of Surgery, Baylor College of Medicine, and Director, Cardiovascular Research and Training Center, Methodist Hospital, Houston.

Monitoring by Computer—*A major new tool in the doctor-patient encounter.*
W. R. Pittman



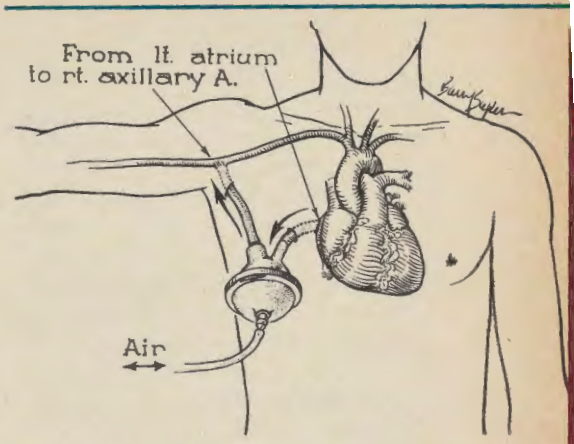
increasingly evident of investing in the search for the *causes* and *prevention* of human illnesses rather than continuously supporting the more costly treatment or repair of disorders once they occur. The discovery of antibiotics, for example, by reducing hospitalization and absenteeism and thus increasing productivity of thousands of workers each year, has been an economic asset. Costly hospitalization for poliomyelitis and prolonged incapacitation from tuberculosis, both previously an economic drain on patient and family, have been virtually eliminated by the fruits of medical research. Effective drugs for diabetes and hypertension have restored countless numbers of people to employment. Dramatic new operations directly on the heart and blood vessels have prolonged and improved the lives of thousands of people who would previously have been doomed to a life of disability, if not to death. Treatment for man's most frightening disease, cancer, has seen remarkable progress, including the excellent anticipation of cure for Wilm's tumor of the kidney in children, choriocarcinoma (a form of cancer) in women, Burkitt's lymphoma, and Hodgkin's disease. The outlook for children with leukemia is much more encouraging now than ever before. Numerous other therapeutic innovations originating in the research laboratory have transformed hosts of people from welfare recipients into taxpayers.

The practice of medicine today, although advanced in many ways, remains largely *retrospective,* with emphasis on cure or palliation once disease occurs. Future attention will shift to prevention as the search intensifies for the causes of illness.

HEART DISEASE. The cause of most forms of heart disease, which remains responsible for the greatest toll on human life, is still unknown. Although we have made significant strides in understanding and treating specific forms of heart disease, we have yet to discover the precise cause of arteriosclerosis, or atherosclerosis—the basis for 95 percent of heart ailments. Observations thus far suggest that we are dealing, not with a single entity, as implied by the composite "heart disease," but with a number of distinct entities arising from different causes. Increasing evidence has now accumulated to show that arteriosclerosis assumes distinctive patterns, both in anatomic-pathological features of the lesions and in rate of progression. In some patterns, for example, the disease is highly localized, often no more than half an inch in extent, with the remainder of the arterial tree being relatively normal, whereas in others the disease is extensive and diffuse, involving many parts of the arterial tree. Moreover, the rate of progression of these different clinical patterns varies widely, from little or no progression for many years to rapid progression within a few years or less, suggesting an acute and fulminating process. Of particular interest is the fact that no significant correlation has been found between such highly ballyhooed presumptive causative factors as diet, cholesterol, obesity, exercise, and the like, on the one hand, and these various distinctive patterns of the disease on the other. Happily, medical scientists are now beginning to direct their attention to a better understanding of the pathogenesis of these different forms of the disease, and a national network of arteriosclerotic research centers is now being developed to intensify and accelerate research on this most important subject. Research will now focus heavily on discovering the specific *cause* or causes of these different forms of arteriosclerosis rather than on peripheral aspects, such as associated risks.

CANCER. Cancer, perhaps the most feared of all diseases, remains unconquered, primarily because its genesis is not fully understood. Among the causative concepts today is the genetic transmission of cancer; that is, "master cancer genes," normally repressed in cells, are inserted into the genetic apparatus from "oncogenic (or cancer producing) viruses." Such genes are believed to be responsible for activation of "slave genes," which effect growth, invasiveness, and metastasis. Chemical carcinogens, such as cigarettes, have been implicated, as have radiation (particularly X-radiation) and specific hormonal factors. It is not yet known whether the susceptibility to cancer of hormonally responsive tissues, such as the breast, uterus, prostate, colon, and skin, is due to a decrease in immune protection with advancing age or to the repeated bombardment of cells by chemical and physical stimuli.

The nucleolus, a small body in the nucleus that produces about 85 percent of all the RNA of the cell, is of special interest in cancer chemotherapy because its function is blocked by specific anticancer antibiotics, including actinomycin D, daunomycin, and the important new antibiotic adriamycin. The attack



Bypass Pump—*Little basis for "such ballyhooed causes as diet and obesity."*

on the nucleolus, like many other chemotherapeutic attacks on cancer, is specific only for growth. In the future, an attack must be made on specific features of cancer, either the "master cancer genes" or other important genes that are non-operative in normal tissues.

We can look forward to the prevention of some neoplasms by implementation of appropriate environmental controls. If viruses prove to be causative for specific types of cancer, preventive vaccines or effective anti-viral therapy can be developed. More sensitive tests for early detection of the disease will certainly be devised.

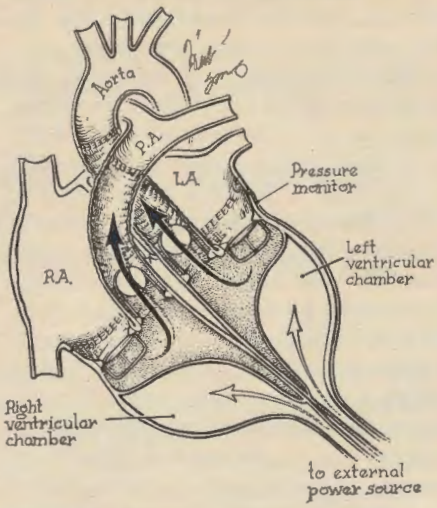
GENETICS. The relative incidence of inherited and genetic defects in hospitalized patients has risen in the United States because of advances in diagnosis and treatment of acquired diseases, as well as increased recognition of the genetic origin of some diseases. Man cannot avoid the ill effects of his genetic composition as easily as he can avoid acquired diseases. Important goals of medical geneticists are, therefore, the improvement of recognition of high-genetic-risk patients or families, the provision of means of avoiding the genetic high risk, the amelioration of the severe effects of genetic diseases, and the correction of the defect of the inherited disease.

Some severe genetic diseases can be prevented by means now available. Physicians can provide genetic counseling to couples planning to have children, prenatal diagnostic techniques can identify many severe or lethal diseases *in utero,* and transmission of many inherited diseases can be prevented by carrier-detection screening. For example, normal-ap-

pearing couples who may produce a child with Tay-Sachs disease can be identified by a biochemical blood test. Normal-appearing carriers of sickle cell anemia are also readily detectable by biochemical methods. Practicable medical approaches, such as artificial insemination and implantation of ova in surrogate mothers, can further reduce the risk of genetic disease. Although these approaches have obvious social and ethical implications, both have been extensively used on lower animals without ill effects. Artificial insemination (fertilization), for example, can eliminate a genetic risk if the father has a disease that can be directly transmitted to his offspring (autosomal dominant), and it can reduce the risk to a minimum for other inherited diseases (autosomal recessive).

Methods of treatment of inherited diseases are steadily improving. Dietary therapy, for example, has proved beneficial for phenylketonuria, a genetic disease producing mental retardation. Treatment of sickle cell anemia with cyanate is yielding encouraging results. We can expect future progress in the prevention of diseases that require both a primary genetic factor and a secondary factor (diet, drugs, social behavior, habit, environment) for the manifestation of the abnormal gene as a disease. Pulmonary emphysema associated with alpha-1-antitrypsin (a body enzyme) deficiency, for example, is strongly affected by the smoking of tobacco. Genetic factors may be important in determining who will have a myocardial infarction as a result of certain contributory environmental elements or who will acquire cancer of the lung from smoking. Research may well lead to positive identification of the second factor responsible for expression of otherwise-silent defective genes, and avoidance of the factor by a genetically different person may prevent development of the disease.

Correction of genetic defects is a direct but difficult approach to treatment of inherited diseases. Two concepts are practical now. The replacement of abnormal or absent circulating proteins has been successful in patients with such diseases as diabetes mellitus (insulin), Burton's agammaglobulinemia (gamma globulin), and hemophilia (factor VIII). It is not yet certain that a component needed inside the cell can be successfully replaced, although some favorable results of research in this field have been reported. A transplantation approach to some inherited diseases has also proved fruitful. Immune-competent cells, for example, have been successfully transplanted to children with inherited immune deficiency, and renal transplantation has proved effective for a variety of inherited diseases of the kidney. An interesting outgrowth of renal transplantation is the possibility that in Fabry's disease the normal donor kidney may provide a continuing source of normal enzyme for other body tissues that are enzyme deficient. The transplanted normal tissue, thus, not only may replace the diseased organ but also may improve the function of other tissues. An obvious long-term goal is correction of cellular defects in genes.



The Artificial Heart—*Refining the art of replacing bodily parts.*

COMPUTERS. Recent years have seen a surge of technological developments in medical research and practice. Of particular importance has been the introduction of the digital computer into daily medical practice. Long used for its computational capability in medical research, the computer has emerged from this traditional role as a major tool in record storage and retrieval, monitoring and control of physiological functions, education of students in basic science, assessment of extensive data to uncover hidden characteristics of a specific population, and has even proved of value in the doctor-patient encounter.

What can we expect in the way of further developments? The digital-computer market is in an extremely dynamic state today, with the primary activity focused on mini-computers and micro-computers. Spurred by a rapidly expanding technological development known as large-scale integration, which can place thousands of components in an area smaller than a dime, the application of these "small" machines has been expanding rapidly, while their cost has been falling.

Whereas the use of small computers in medical care can be expected to increase, they are unlikely to replace the traditional functions of large computers —central file control and large-scale computational support for clinical and basic research and for national medical data banks to serve the needs of an increasingly mobile population. We may expect to see primary-care physicians expand their use of automation in diagnosis and care of patients. Ventures that have already proved successful are automated processing of the electrocardiogram, evaluation and warning systems for multiple drug interactions, and development of a variety of "computer-consultants" to support specialized therapy through dialogue between physician and computer. Such an approach affords uniformity of care and rapid application of recent discoveries at the bedside. These same "computer-consultants," which are actually sophisticated programs that detail the thinking of experts in a given field, will also provide a uniform foundation for training newly graduated physicians in various disciplines. The primary-care physician may also benefit from adoption of computer-stored patient records, which permit the transfer of information frequently needed in group practice and health-maintenance organizations.

During the past few years, a variety of experiments has demonstrated the utility of the digital computer in caring for critically ill patients. Moderate success has been achieved, but much more work is required before the best approach to this problem can be selected. In some instances, the major deterrent to progress is the lack of a suitable measuring device (transducer) for needed clinical information. Once this device has been found, the optimum array of measurements must be determined for each patient. The computer has already proved feasible for measurements, formulation of therapeutic decisions, and, in some environments, direct intervention in patient care.

IMPLANTABLE PROSTHETICS. Research into various implantable prosthetics, notably artificial hearts, shows promise of clinical application in the future. These prospective devices, in addition to cur-

(Continued on page 124.)

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Dravo is involved in many other activities that help meet vital needs such as mineral resources development, increased food supplies, and pollution control. But in today's world of shortages, increasing energy supplies may mean the most to you. Sure, it's nice to have the lights out once in a while. But isn't it nicer when *you* pick the time?

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- **For black-and-white:** An unusual cruise for two aboard the *Royal Viking Sea*, departing from New Orleans for Mexico, Central America, and the Caribbean islands.

Plus

Additional exciting travel prizes to Europe, to the Bahamas, and within the United States.

* * *

Award-winning photos will be featured in Saturday Review/World's Travel Calendar issue—January 11, 1975.

Judges for this year's contest are the internationally renowned photographers Richard Avedon and André Kertész; Weston Naef, curator of photography, The Metropolitan Museum of Art; SR/World's editor Norman Cousins; and photography editor Margaret R. Weiss.

Read the rules and start submitting your photographs now. Deadline for entries is October 1, 1974. Mail them to SR/World Travel Photography Contest, 488 Madison Avenue, New York, N.Y. 10022.

CONTEST RULES

1. The contest is for amateur photographers only. Anyone is eligible except employees of Saturday Review/World and members of their families.
2. Pictures, which convey a feeling of travel, must have been taken after May 30, 1973, in a locale visited on a vacation or business trip away from home.
3. Black-and-white photographs
   a. Prints must be submitted in glossy prints 8x10 unmounted.
   b. On the back of the photograph must appear: name and address of photographer; make of camera and film used in taking the picture; date and place it was shot.
   c. Developing and printing may be done by a photofinisher or the entrant. No artwork or retouching on prints or negatives from which they are made is permitted.
   d. No negatives should be submitted.
   e. No black-and-white prints will be returned.
4. Color photographs
   a. Color pictures may be submitted as either transparency OR print. Do not submit a transparency and print of the same picture.
   b. Transparencies must be originals and must be mounted in cardboard only.
   c. Color prints must be no larger than 8x10 unmounted.
   d. The same data must be given as specified above for black-and-white prints and must be written on the mount of each transparency or on the back of each print.
   e. Transparencies and color prints will be returned only if accompanied by return postage: a minimum of 50 cents in stamps or coins. Do not send self-addressed envelopes.
5. Saturday Review/World reserves the right to publish within its own pages as part of the Awards competition any pictures submitted whether winners or not.
6. To enter the contest, mail no more than two entries (black-and-white and/or color) to this magazine's Travel Photography Contest. All entries must be postmarked no later than October 1, 1974, to be eligible for judging.
   IMPORTANT: NO MORE THAN TWO PICTURES MAY BE SUBMITTED BY ANY ONE ENTRANT.
7. Pictures will be judged on photographic quality, originality in choice and treatment of subject, and the sense of travel they reflect. The decision of the judges will be final.
8. Before receiving a prize, the entrant must sign a statement that he is not, and has never been, a professional photographer, that the picture(s), or any closely similar picture of the same subject or situation, has not been and will not be entered by him in any photographic contest other than the one conducted by this magazine, and has not been and will not be offered for publication in any manner prior to January 11, 1975. Saturday Review/World retains first publication rights on winning pictures and the right to use them for promotional purposes.

Beyond the City Limits

The shock of lower living standards means restructuring wasteful patterns. Coming: clean air, regional cities, and the return of suburban land to farming.

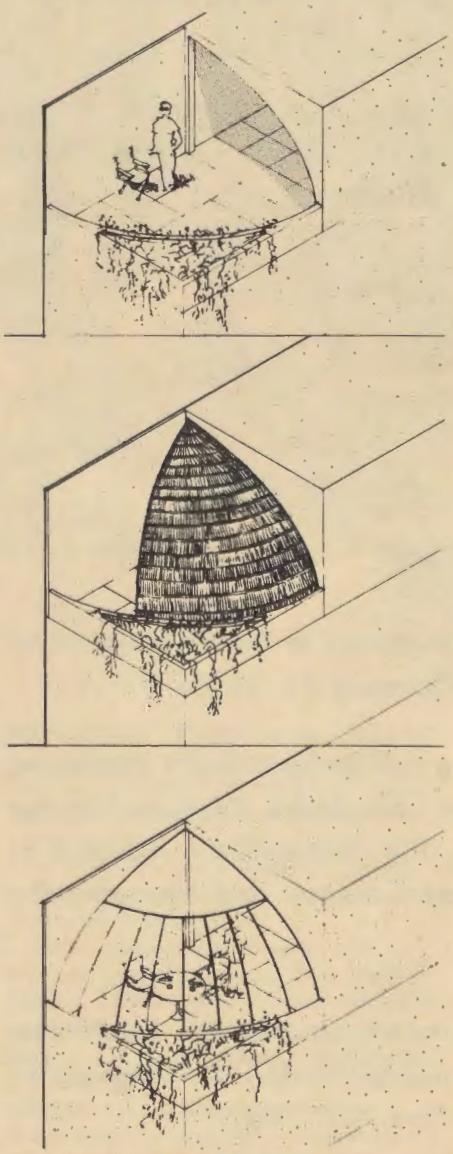
by Moshe Safdie

In the coming 50 years, a greater equalization and distribution of resources will take place among the people of all countries regardless of whether they are today developed or underdeveloped. First will come a war on resources and raw materials in which countries having a monopoly on raw materials will blackmail the others for a greater share of total world resources. Assuming that we manage to come out of this alive, without a world holocaust, it will become increasingly obvious to all countries that the uneven distribution and consumption of resources, characteristic of the past, is morally, ethically, and practically unacceptable. The welfare state will become the welfare world, and with it will come a sharp and severe decrease in the standard of living of the developed and industrialized countries. The decrease in the standard of living and in available energy and resources that will take place in the last two and a half decades of this century will make possible the radical change in the form of cities that is to emerge in its full flowering by the year 2024. Architecture, building forms, transportation, will all be affected by the per-capita availability of energy and resources. The decrease in the standard of living will be a temporary one, a shock treatment that will make it possible to restructure and correct many of the wasteful patterns in the city today.

To dramatize what such a world will look like, I have projected myself into the twenty-first century. In the account below, it is 2024. I am 86 years old, but that is not remarkable, since the average life span will have been extended from 70 to 95. My daughter, who is now 13, will be 63. That fact makes me comprehend the passage of time more than my own age does. M.S.

Israeli-born architect Moshe Safdie is best known for designing Habitat at Expo '67. His books include Beyond Habitat *and* For Everyone a Garden. *He lives in Canada.*

I live in a rather large dwelling; it is on the forty-sixth level in one of the new communities that were constructed along the regional trunk line. My dwelling has a central space, a kind of living-working space, and around it in one direction are private sleeping areas, three or four of them. One of them, where my wife is resting, is presently enclosed; the other two are in an open position, set by pressing a button that moves telescoping partitions and adds to the overall space of the house. On the other side is a greenhouse, garden, and solarium. I enjoy my gardening, and as it is winter now, the garden is enclosed by an adjustable transparent dome. By a slight adjustment, I can cut the light transmission coming in through the dome in proportion to the temperature of the day and the brightness of the sun, and by another adjustment, I can have the telescoping dome unfold to the open sky. The windows in my house are quite different from the ones I had in my younger days; they are like retinas: they project outward so that when you stand within them, you can see at a 180-degree angle. They have a brightness control that can be opened or shut to produce a 10-percent light transmission. (All this is achieved by a thin liquid that is passed under pressure through the cavity between the two transparent panes.) I won't bore you with a description of the appliances and other conveniences. After the great craze for total air conditioning of every man-made space, including the larger urban public spaces, that took place around the year 2000, we have now reacted and returned to a happy balance of having climate control only on uncomfortable days. Since the air has been cleaned and pollution totally eliminated, a much greater reliance is placed on opening up the dwelling and enjoying the outdoors. The new communities now have total energy, full recirculation of wastes of all kinds, and pneumatic disposal of the little waste that remains after its total breakdown in the project energy center. There is also an automatic pneumatic system for delivery of small and large parcels in the mail.



From the office of the architect.

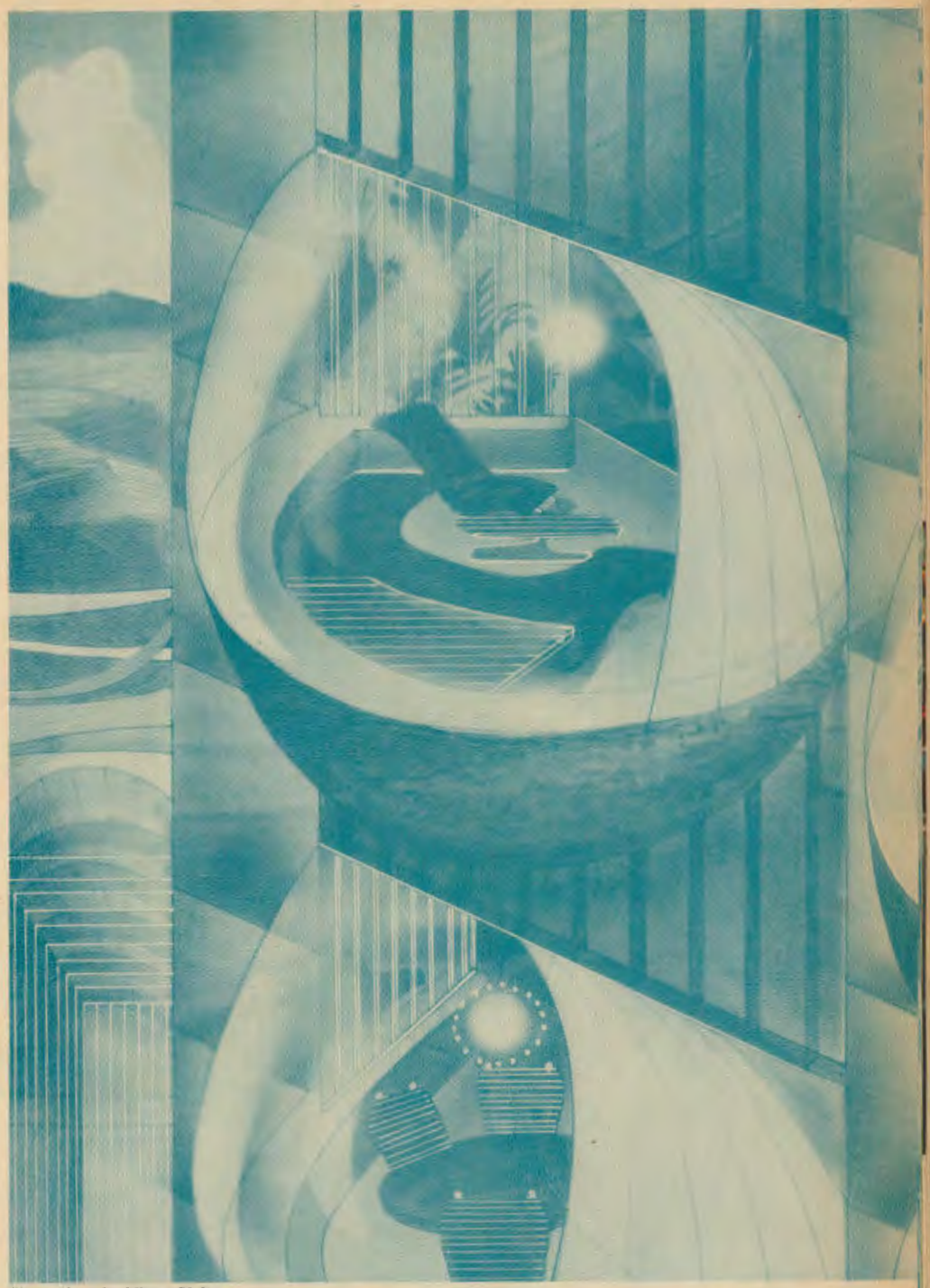
Outdoor Spaces, Jerusalem—*"a greater reliance on opening up the dwelling."*

As I look out from my terrace, I can see other parts of the community. They are very much like hills in a mountain landscape. They are far enough away so that I cannot tell what is going on in people's houses. They look like graceful slopes of landscaped gardens and terraces, gleaming bubbles, and in the valleys between those "hills" are parks and public spaces marking the route of the great trunk line.

The walkway serving my unit is a transparent tube. Every few hundred feet there is a convenience center—a small grocery store, dry cleaners, and so forth. Having walked about 100 feet in one direction, I come to what reminds me of the elevators of the old days, except that there are no buttons to press

and no waiting. Small vehicles with seats are running on an incline in another transparent tube. As we pause on the platform, one is automatically ejected, and as we sit on it, it is automatically returned to the driving shaft moving on an incline at an accelerating speed. We press "community interline." Our little car swings to the horizontal track as it comes nearer to the ground, if one can tell where the ground is, and it interlocks with another vehicle, which is running on an adjacent track; as we step from our vehicle to the other, while they are moving side by side, and take our seats, they disengage. The vehicle we are sitting in now immediately joins what seems to be a little train of five or six cars. Moving at a moderate speed, we pass by a large shopping center, surrounded by a large, transparent enclosure partially formed by the houses. On our right, beyond the enclosure of the hill-like houses, is a park with playfields of various kinds, and on our left, beyond the local shopping center, are work areas consisting of offices and automated industries of various kinds. The shopping center is like a terraced bowl, four stories deep, with shops running around it and a public-entertainment area at the lowest level. It is filled with much greenery and sunlight.

Our local train swings in an arc around the uppermost level, and as we press the appropriate button, our vehicle is disengaged and ejected, continuing to move slowly as we leave it and step onto a moving belt. There are many hundreds of people here, some shopping, some sitting in the open cafés (which, alas, have hardly changed in hundreds of years). Children are playing in the garden at the lowest level. There isn't a vehicle to be seen; conveyances have totally changed in the past 50 years, as we shall see. There is only the silent movement of the community train coming around the circumference, discharging and picking up people and then going back and interlinking with the great trunk line and the inclined elevator lines.



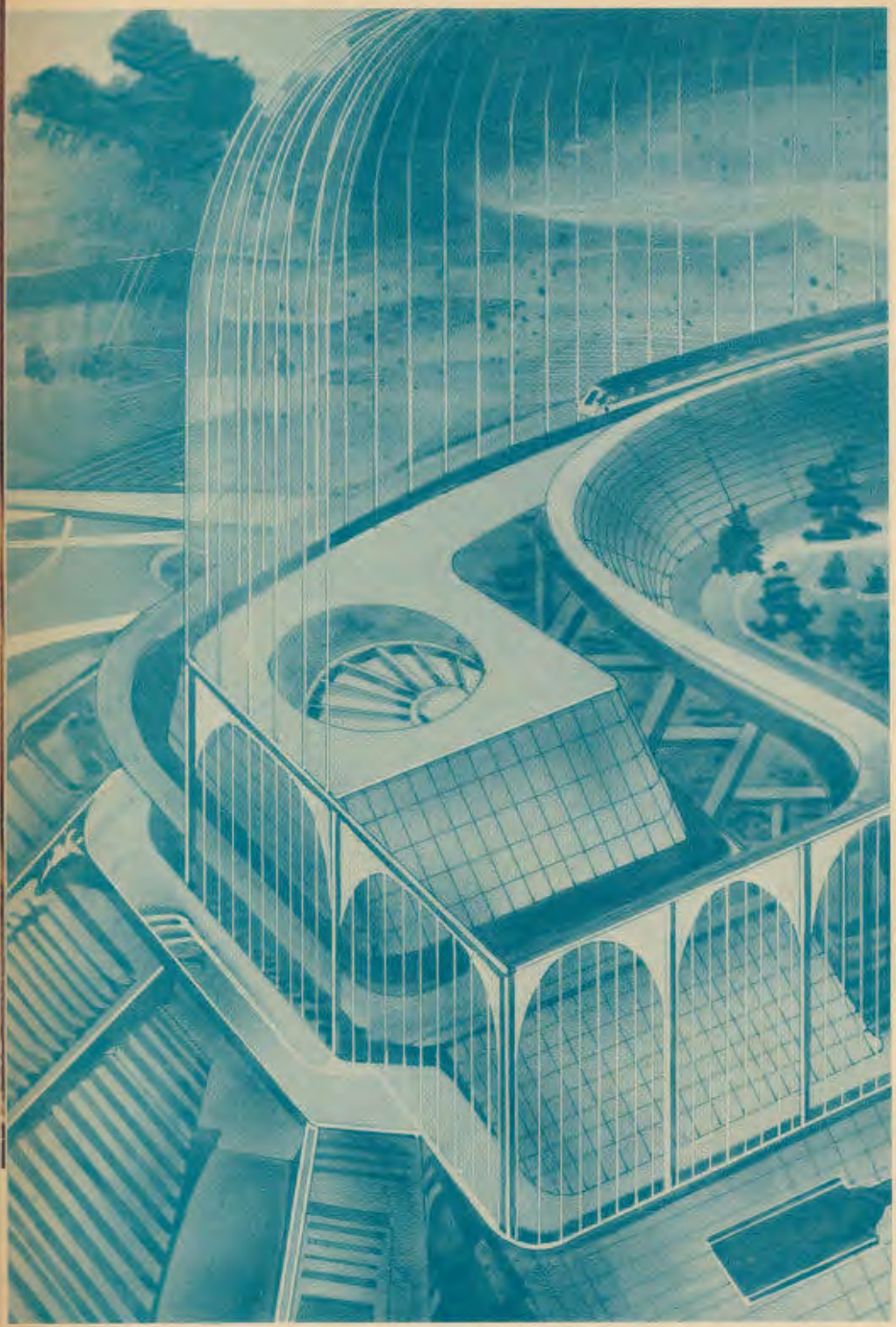
Illustrations by Victor Valla

Apartment on the Forty-sixth Level on the Regional Trunk Line—*"Gleaming bubbles."*

The terraced, horseshoe-shaped center is enclosed on two sides by the cantilever walkways of the residential structure above. On the other two sides, the center is open to a vast park, which is clearly visible from the shopping areas. Part of this enclosure is covered with a large, transparent domelike structure. It is made up of pivoting and moving discs. It is winter now, and these discs are in their open position; through the transparent bubbles between them, sunlight is streaming in. As the sun moves and the seasons change, the discs shift, decreasing the transparency of the shelter until at high summer, as the noon sun hits above, only sprinkles of sunlight, very similar to those which penetrate through a fully leaved tree, shine into the shopping areas below.

The architecture is not fixed; it is ever changing. It changes with every hour of the day, and it changes from season to season. The feelings of enclosure or openness, brightness or darkness, are not fixed qualities of the public environment.

To visit our regional business center, we must leave this community, taking a trip that may provide you with the complete picture of our city in 2024. We are back on the moving belt at the edge of the community shopping area. It is mov-



A Shopping Center Like a Terraced Bowl—*"It is winter; the discs are open."*

ing at 3 or 4 miles an hour, and we are now running parallel to a little car similar to the one we used before. Still moving, we transfer and press the appropriate button; the car speeds up gradually, moving at 15 or 20 miles per hour, and then interlocks automatically with another car almost identical with ours, except that it is totally enclosed by a plastic bubble and is a different color. A beeping sound continues until we have risen from our seats and moved into the other car. As soon as we sit down, the door slides closed and the two vehicles disengage. We are now moving at a much greater speed, and we find ourselves directed into another line. Our little car joins others to form a rather long train. It appears that we are moving at something like 100 or 150 miles per hour. As we leave our neighborhood, we find ourselves moving adjacent to other neighborhoods. They appear to cover some 500 acres each, and rising about 40 or 50 stories, they form hill-like structures upon the landscape. Our train is now going through agricultural areas: it seems that the cultivated land extends right into the residential neighborhoods. Unmanned automatic machinery appears to be operating in the fields. After traveling about 10 or 15 minutes, we see on the horizon a mass rather larger than the neighborhoods we have been passing; before we know it, our car has disengaged itself from the main train and has moved onto a side track, slowing down considerably.

A few minutes later, a car similar to the one we left in the neighborhood locks onto our vehicle; the beeping sound gives us the signal to change cars, and once again disengagement takes place. Our car moves into an enormous space—nothing you could have seen in 1974 would have prepared you for what we are seeing here. This space, enclosed by structures and fully lit by natural daylight, must be some 20 or 30 stories high. On two of its sides, it is enclosed by an inclined structure that is transparent and accommodates offices. There appear to be all kinds of businesses going on at the various levels, all linked by small inclined vehicles similar to the ones we used in the residential area. The lower levels rise some five or six stories and appear to be like an enormous, endless market—hundreds of thousands, maybe a million, square feet of shopping arcades, department stores, movie theaters and other entertainment sections, auction areas, open fruit and vegetable markets. There seem to be thousands, tens of thousands, of people visible everywhere. To our left there are structures that appear to be industries. At lower levels the great activity of interregional shipping is visible. Even here, though, looking through the great apertures facing south, we are aware of parkland and plowed fields coming right to the edge of this center. The center covers some 200 acres. Not only is it a business center, but also it has several hotels, some residential development, some industry, and 20 million square feet of office space. It is one of several such centers that have been built in the region in the

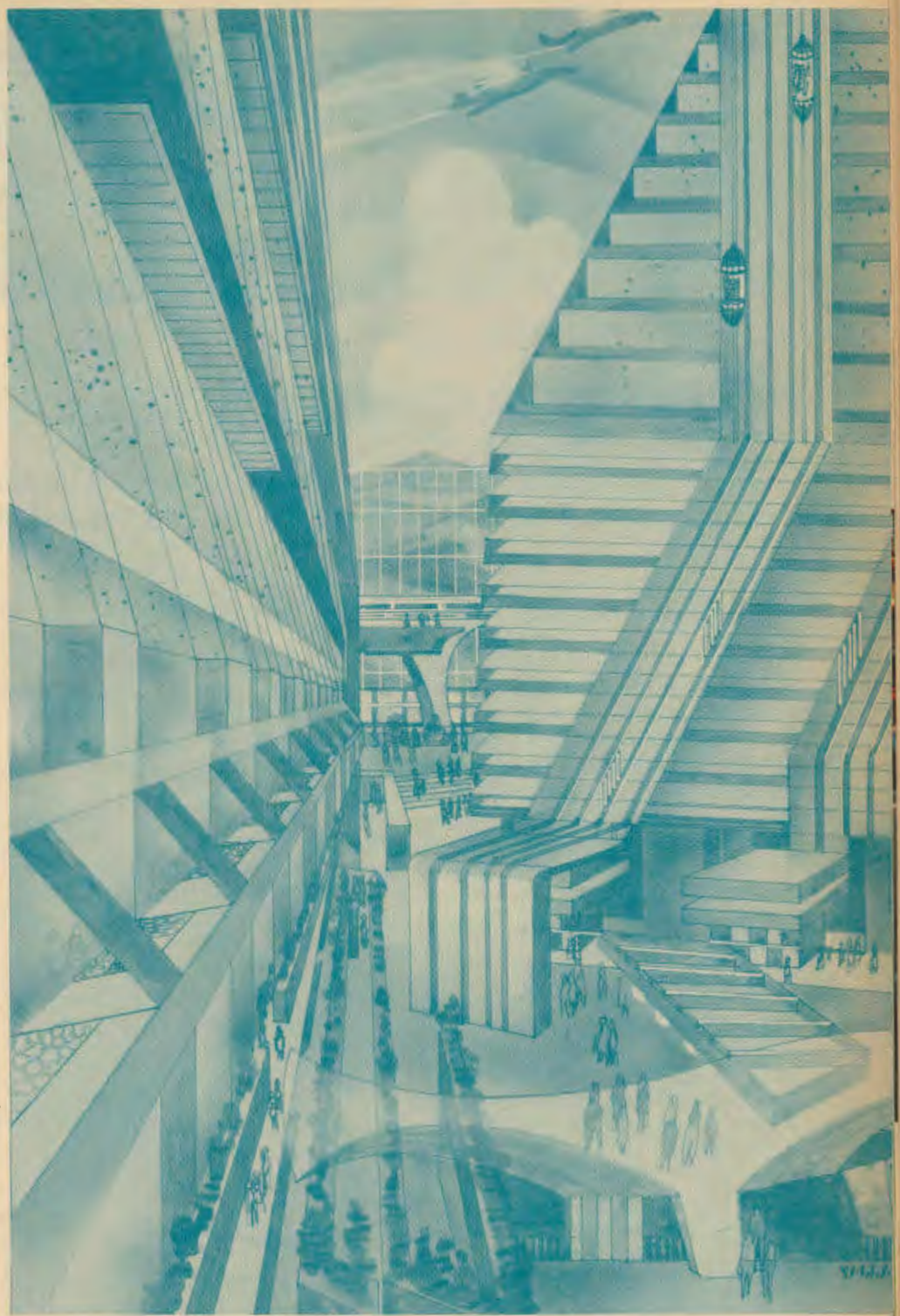
past 30 years. One center is next to the regional airport, and there are several others along the regional trunk line. Many business activities that were concentrated in the old city centers moved here as superior and more accessible facilities were offered.

It has been only in recent years that the resources have become available to dramatically overhaul and reconstruct the older city centers. These have now been restored to their older role as the main and most important centers in the region. However, whereas in the 1970s we used to think of a major downtown area surrounded by suburbs containing minor centers, the regional city, owing to the trunk line, now contains many centers, each with its own particular characteristics and specializations, related to major manufacturing facilities, education facilities, universities, and hospitals, and all linked to and surrounded by new residential neighborhoods.

While I have chosen to live in one of the new multi-level residential neighborhoods, many people have had the option of living in the open countryside at much greater distances from the new centers and farther away from the regional trunk line. In each of the major stations along the regional trunk line, you can pick up a personal vehicle that is available in addition to the automatic transit system. At the point of descent from the train, you can punch a button for a "private vehicle," and our little car will swing into a parking storage area where these vehicles are kept. A little bit of history about this facility may be helpful. The private vehicles, which come in a range of sizes, seating two, four, six, or eight, are not privately owned. Electrically powered, they are a public facility as accessible as pay phones; they are to be found everywhere in the regional centers in great numbers, and in smaller numbers in thousands of distribution points across the urbanized areas.

In the 1980s, because of enormous parking costs and because the energy crisis drove the price of fuel up, many people chose to do without the private automobiles that were so commonplace in the 1970s. With the construction of the great trunk lines, people found that they needed private vehicles only occasionally, because travel to work and within the urban centers was faster, cheaper, more convenient, and more relaxing by the automatic system than by private vehicles. But for trips to the country, and for those who preferred to live in the outskirts, private vehicles were still a necessity—a basic ingredient for completing the total structure of maximum mobility. And so, in the late 1990s, private associations began springing up in which individual members had access to vehicles that they would use only when necessary, being billed in terms of time and distance traveled by an automatic credit system. They could pick up these vehicles at any given point and deposit them anywhere, making them available for other members of the association. By the late 1990s all

(Continued on page 126.)



An Enormous Business Center 30 Stories High—*"Lit by natural daylight."*

The 21st-Century Woman — Free at Last?

A heavy thicket of female twigs has sprouted on the Establishment tree, but it may take a full century before we see the dawn of the Age of Equality.

by Clare Boothe Luce

Anyone—feminist or anti-feminist—who reads the above title knows that the author intends to speculate on the "gut" feminist question: the chances of overthrowing male supremacy in our social order and achieving equality of the sexes.

Will the male, in America, still be considered superior to the female a half-century from now? Will the American woman's political, economic, and social status still be inferior? Will her individual social status—the respect given to her in her community—still largely derive from the respect accorded to her husband or other male relatives? Will her chief claim to a place in history still consist in being, or having been, some famous man's wife or mother? Will woman still be only a consumer of goods and a spender of money, or will she also be a co-equal producer of goods and a co-equal maker of money?

Speculating on the future status of woman in American society is surely one of the easiest of any of the assignments given to any group of crystal-ball gazers. Provided, of course, that one is permitted one large assumption—that America will remain, until 2024, a democratic and relatively affluent country.

Clare Boothe Luce has been playwright, congresswoman, and ambassador. She serves on the President's Foreign Intelligence Board and the board of editors of Encyclopedia Britannica. A devotee of the sea, she lives in Hawaii.

This assumption granted, the writer need only review the rate of progress that her sex has made toward equality in the last 50 years; note any new facts, statistics, or signs that favor—or disfavor—the trend; and then, extrapolating from the indexes of the past and the present, discern a fairly good picture in her crystal ball of the status of woman on *Saturday Review*'s one hundredth birthday.

So let us emulate Bob Benchley's wonderful mythological bird, the Killeyloo bird, which, whenever it took off on a new flight, always flew backward first, because it couldn't tell where it was going until it had seen where it had been.

In 1920, when the Republic was already 144 years old and black men had already had the franchise for 50 years, women received the basic right of all free-born citizens—the right to vote. Because females then represented just under 50 percent of the population, this was a staggering grant of potential political power. Certainly, at the time, it seemed enough, if it were energetically used, seriously to challenge the existing political order.

Fifty years ago all our great institutions—religious, political, judicial, economic, military, educational, professional, cultural (museums, theater, opera, orchestras, and so forth), and informational (the media)—were totally male-dominated.

What is the situation today, 50 years later? "The Establishment," as represented by the above institutions, is still —root, trunk, and branch—male-dominated. It has sprouted a heavy thicket of female twigs at its base, and many of its middling branches are covered with clumps of feminine foliage. But out of a female population of about 107 million, there are not today 100 women perched in posts of command or in high supervisory or policy-making positions in its upper branches.

The failure of women to translate their superior numerical strength at the polls into political power for members of their sex has been utterly dismal. In the 54 years since women were enfranchised, only 3 women have been elected to the Senate, and 78 women have been chosen as representatives to the House. There have been only 3 women governors, 2 women Cabinet members, and 14 women ministers and ambassadors. And only one of these was appointed to a major country.

Today there are *no* women in the Cabinet, *no* women in the Senate, *no* women governors, and only 16 women representatives (fewer than in several previous Congresses). Our 4 women ambassadors serving abroad are in Barbados, Zambia, Togo, and Luxembourg.

There is no way by which even the most optimistic feminist can translate these minuscule figures into a record of feminine progress toward equality in politics.

What makes the virtual disappearance, in 1974, of women from high elective or appointive office even more disheartening is the fact that throughout the past five decades women have been appearing in ever-greater numbers in the roles of "party workers" and candidates

(Left to right): Author Joan Didion; Publisher Katharine Graham; Historian Barbara Tuchman; Rep. Shirley Chisholm; NBC's Barbara Walters; Anthropologist Margaret Mead; Sculptress Louise Nevelson; Writer Gloria Steinem.

for lower-rank offices at the local and the state levels. But scarcely more than a handful of even the local candidates have made it to the top local level—the mayoralty. Today "Her Honor the Mayor" is as rare an *avis* as a madam president of a university. (Yesterday most of the presidents of women's universities were women. Today many have been replaced by men.) In politics women work as the aides and the auxiliaries in the male-dominated political structure. *She* types the letters, licks the stamps, tacks up the party posters, hands out the campaign buttons and literature, and gets out the vote. *He* gets elected.

The picture is the same in those other three powerful institutions—finance, business, and the media. Ten years ago there were 168 women bank presidents and 688 women vice-presidents. By July 1973 there were only 40 women bank presidents and 400 women vice-presidents. Out of 1,366 members of the New York Stock Exchange, only one is a woman, who is also the first. Today Estée Lauder is about the only well-known self-made woman who is at the head of her own business and comparably as successful as the now-deceased Helena Rubinstein and Elizabeth Arden were at the half-century mark. (In passing, the enormously successful Arden and Rubinstein enterprises are now headed by men. During the past 30 years men have had a brilliant record of moving in at the top of the successful businesses started by women.)

During the past 50 years, there were, perhaps, a dozen successful women publishers and another dozen or more successful women magazine editors. Today, Dolly Schiff of the *New York Post*, Kay Graham of *The Washington Post*, and Oveta Culp Hobby of the *Houston Post* are the only well-known female publishers of large and successful papers. None of them, however, "made it to the top" from the editorial or reporter level. All were heiresses. Mrs. Graham floated into power on a controlling interest of the stock that she had inherited from her deceased husband and father. Mrs. Hobby inherited her paper and her position from her husband. Mrs. Schiff bought the paper with family money. As things stand, this seems to be virtually the only way a woman can "arrive at the top" of any large publishing venture. Occasionally, the widow of the head of a large business is invited to sit as a director on its board.

There was not a single woman on the rosters of the highest-paid executives of 1971, compiled by *Forbes* and *Business Week* from proxy statements. (Mary Wells, head of Wells, Rich, Greene, Inc., made *Business Week*'s list for 1973 with earnings over $400,000.)

THE OVERWHELMING MAJORITY of rich American women have acquired their wealth by inheritance. No doubt there are some women today who, by their own efforts, have amassed a fortune of more than a million dollars. But when I asked an editor friend on a national news magazine to find me a half-dozen names, he said that the only women whose names came to mind were actresses, entertainers, or "lady novelists." Later he reported back that his research department would "dig for some successful business women." (I left him digging.)

Almost all of the mass-circulation women's magazines were once edited by women. Today most are edited by men. There have never been any outstanding women producers in the motion-picture industry, save for Julia Phillips, co-producer of *The Sting*. There is no woman director of an important museum. No woman conducts a successful symphony orchestra.

One statistic suffices to reveal the situation in the world of education. In 1972 women comprised 57.6 percent of the professional educators in New York's public schools but only 1.7 percent of high school principals.

Everywhere, everywhere, in a man's world, woman is working but not at the top of the economic pyramid. She is very much present at the bottom.

Today, women represent 39 percent of the labor force. There was an increase of 12 million jobs between 1960 and 1970. Sixty-five percent of the new workers were women. Married women outnumber their unwed sisters by almost three to one. About half of the married working women have children under 18. The majority of working women are in "sex-typed" jobs and in the low-wage-level jobs—the menial jobs—in business and industry. Forty-five percent of all adult American women today are working outside the home. They are often paid lower wages than men receive for similar labor.

This figure, however, does not represent that largest working-woman class of all—the stay-at-home housewives, who receive bed, board, and clothing—but no wages. (And they have no stipulated hours of work.) A recent study done by the Chase Manhattan Bank shows that the services that the average housewife performs (as nursemaid, cook, laundress, dishwasher, seamstress, and cleaning woman) would be worth, in the hiring hall, $8,285.68 a year. American housewives contribute $250 billion annually in services to the country. If the institution of marriage should collapse, the economy would collapse with it. This

survey also shows that the average housewife who works outside the home, supplementing her husband's earnings, works 100 hours of the 168 hours in the week. If she were being paid for all the hours she works, even at the two-dollar-an-hour minimum rate, she would earn $10,400 a year. The median wage of a working housewife today is less than 60 percent of the median wage of a male working a 40-hour week. Can anyone see a trend here toward the economic equality of the sexes? On the contrary, in relation to the working male, woman's economic condition, inside and outside the home, seems to be getting worse.

Today, all over the world, we see the phenomenon of the widening gap between the incomes of the have and the have-not nations. The same thing is happening inside America in respect of the median earnings of male and female wage earners. The median income of working women, which in 1969 was 60 percent of the males', by 1972 had fallen to 57.9 percent. It is still falling. The plain fact of the matter is that there are few economic indexes that show any progress whatsoever toward the equalization of male and female wages.

ONE COULD GO ON multiplying statistical proofs that woman's progress toward social equality is an illusion. It is probably an illusion created by the fact that women, no longer socially segregated and confined to the home, have entered man's world in great numbers.

In respect of woman's number-one job, housewife and mother, she is, economically, somewhat worse off than she was 50 years ago. For thousands of years (in Western civilization) monogamous, until-death-do-us-part marriage was woman's best—and only—path to any kind of economic security. While marriage locked her for life into her husband's economic situation, it also locked him into a lifetime responsibility for her support. Rich or poor, he could not, with legal and moral impunity, leave her and their children stranded, with no means of support.

Now, I take it as axiomatic that in a male-dominated society, no social institution—including marriage—can long endure which does not serve the self-interests of the male. For centuries monogamous, indissoluble marriage served man's best interests. In the pre-industrial age, large families were an economic asset. Children are no longer an economic asset; they are increasingly an economic burden. Large families have had it. Marriage has not; a wife is still an economic asset. How else today can a man secure 8,285.68 dollars' worth of free personal services each year—and a bed partner to boot? But man has always been more unhappy with the until-death-do-us-part aspect of marriage than woman. Divorce presents far fewer problems for him than for her. Today, one out of three marriages ends in divorce. The majority of all divorces between couples who have been married ten years or longer are initiated by the husband (who more or less promptly then marries a younger woman). But whether the couple divorces early or late, in the overwhelming majority of divorces the economic and social condition of the divorcée is worse than that of her divorced husband. The longer a marriage has lasted before a divorce takes place, the less the chances are of the divorced woman's finding another mate or any kind of employment that is not menial. Unless she has property and an income of her own, the divorced woman over 35 is certain to live in reduced circumstances and to find it hard to support herself. Divorce is a luxury upper-class women can afford. It is hard, sometimes brutally hard, on middle- and lower-class women. The overwhelming majority of the people on the relief rolls today are divorced or deserted wives, or widows, and their children. Wherever you look today, you will find women at the lower and lowest levels of the social pyramid. They are the poorest and the most numerous of the poor, the indigent, and the destitute. The black woman is, of course, at the bottom of the bottom.

CONSIDERING this gloomy picture, one may well ask, What is there for a feminist, in the year 1974, to cheer about? And why did an intelligent and sensitive editor tell me recently that he foresaw "a tidal wave" of feminism rising in the land which, if taken at the flood, would lead women on to fame and fortune?

I suspect that he, like so many other men of goodwill and large mind, is exaggerating the importance of three breakthroughs for the female sex that have more or less recently occurred.

(Top to bottom): Artist Georgia O'Keeffe; Rep. Bella Abzug; Editor Charlotte Curtis; ex-Sen. Margaret Chase Smith; Television Producer Joan Ganz Cooney.

The first is the advance made by medical technology in giving woman control over her own reproductive function. The availability (to American women) of reliable contraceptives, especially the Pill, is *potentially* of great help in her struggle for equality.

The talk about what "nature intended" in respect of the social roles of the male and the female is a lot of nonsense. Roles are character parts played by the *dramatis personae* in the human tragedy. Roles are, by definition, assignable—and *re-assignable*—at the discretion of society. People play them well, or badly, willingly or unwillingly. It is, of course, always to the best interests of society that the roles which its members play should be well and willingly played. In a truly participatory democracy, all its characters or citizens would be free to choose their own roles.

IT IS A HISTORIC FACT that there is no social role that has not, at some time, somewhere, been played by a woman. Women have been absolute monarchs and heads of states. They have also been (outside of the West) priests. Tinker, tailor, soldier, sailor—women in one culture or another have played every masculine role. And vice versa. Women were once the vintners, the farmers, the weavers, the animal breeders of society. Now men are. Is cooking today a male or a female role? The cook who cooks for nothing is a female—or a housewife. The cook who cooks for $25,000 is a male—or a chef.

Even the so-called female nursing role is often played by men. The American male who rises at 2:00 A.M. to feed baby his bottle is playing a "woman's role."

Nature assigns no "roles" to her creatures. She endows them with instincts and functions, which are not re-assignable. And she lets her role-playing human children take it from there. Nature intended them to procreate, since it endowed them—and heavily—with the copulative instinct. (In view of the fate of the once-dominant dinosaurs, whether nature *intended* any particular species to survive—including humans—is an open question.) Nature also endowed the sexes with different procreative organs and programmed them for different functions. It programmed a healthy male with the capacity to copulate tens of thousands of times (the spirit moving him) in the course of a lifetime. It programmed a healthy female with the capacity to bear between 20 and 30 children. I venture to suggest that there are few American men today who think that women should stick with nature's program—or, as the expression goes, "play the role of mother, for which nature intended them."

(Top to bottom): Tennis player Billie Jean King; Rep. Elizabeth Holtzman; Editor Helen Gurley Brown; Rep. Barbara Jordan; Executive Estée Lauder.

FOR CENTURIES, women had no control (except abortion) over nature's programming of their procreative function. Consequently, owing to successive pregnancies, they were unable to play many of the social roles that they otherwise could have performed quite ably.

Thanks to contraceptives and the Pill, woman no longer is forced to choose between no sex or the once-inevitable 9-months, 9-pounds consequences of the sex act. For the first time in history, she is—*almost*—as free as man to opt for the roles she wishes to play in society. Motherhood has now become a role that she can assign to herself or refuse to have assigned to her even by her husband. The social consequences of this new freedom, however, await the verdict of history. For the past 50 years woman has used her political freedom badly. It remains to be seen whether she will make any better use of her sexual freedom. But the opportunity of using it to her own best interests is there.

A human's "best years," in the role-playing market, are between the ages of 18 and 65. Depending on how many children a woman chooses to have, she can make herself available today as a role-player for all, or part, of these years. *If* (and this is a point I will come to later) she is determined to get a particular role, and *if* society's historic role-assigner—the male of her species—can be made to give it to her, there is no longer any reason why she should not play it.

The second great breakthrough favoring the goal of sex equality is the opening of the doors of higher education to women. Today a girl who can make it to college can get the same education as a boy—right through the Ph.D. level. Today she is free to study for any "masculine" career that her own ambition suggests. But as matters stand, her ambition is understandably dampened by the knowledge that even if she graduates at the top of her class, she will not find it

"I now reach, somewhat reluctantly, for my crystal ball. I am sorry to say that the picture I see is not one of Woman sitting in the Oval Room of the White House.... I see her still making her way up."

easy to translate her well-earned degree into an upward-mobility job. Nevertheless, the educational opportunities and facilities that have been opened to women in the last decade are one valid cause of the recent breeze of optimism that is blowing in feminist circles. The ranks of the feminist leaders are being swelled every day by the female graduates of the universities.

A third cause for feminist optimism is the progress that is being made in the legal area. Groups of well-organized professional women and feminists are taking skillful advantage of the civil-rights bills and government regulations originally designed to end discrimination against black *males* and are applying them to end discrimination against females. Too much credit cannot be given to the organized groups of feminists for the vigorous pressure they are putting on the government and the courts.

I now reach, somewhat reluctantly, for my crystal ball. I am sorry to say that the picture I see there is *not* one of Woman sitting in the Oval Room of the White House in 2024. I see her playing many more roles that were once considered masculine. I see her making a little more money than she is making now. But I see her still trying to make her way up—in a man's world—and not having very much more success than she is having now. There may be, and probably will be, great political and technological changes in the world in the next half-century. But I venture to suggest that none of them will greatly affect the relatively inferior status of the American woman.

Several years ago, Edward A. Shaw, dean of job placement at the Career-Planning Center of U.C.L.A., explained to a woman interviewer that although women now have many jobs in which they sit apart and analyze, identify, and solve business, industrial, political, and scientific problems ("think jobs"), they are still not getting jobs with upward mobility in "line management." "There is," Mr. Shaw said, *"an underlying cultural reluctance to have women bossing men."* And this is the very heart of the matter.

Throughout recorded history, in all civilizations at all times and in all places, the underlying culture in respect of the *most important of all human relationships*—the male-female relationship—has been patriarchal: the male has had dominion over the female throughout recorded history. It is much too late in this article to point out that the prehistoric cultures were matriarchies or to argue the question of whether patriarchy is what "nature intended." (However, I have already indicated that I think it is not.)

But there is, perhaps, time to make three quick points: first, feminists who are bent on knocking out a worldwide underlying culture, which shows no great signs of collapse, are taking on a pretty large assignment.

Second, the very durability of the superior male–inferior female relationship is reasonably good proof that it has *so far* served the best interests of human society. It has certainly permitted the survival of woman, inferior and unhappy though her lot has been. Despite man's undeniable inhumanity to woman, she not only has survived but represents today half of the world's population. Indeed, woman has not only survived her treatment as an inferior in greater numbers than her "superiors"; in modern times she survives some five years longer. Male supremacy has kept her down. It has not knocked her out.

Third, and last, the fact that male superiority has lasted so long is not in itself proof that it will survive even another century. (Though the odds are certainly that it will.)

THE INSTITUTION OF SLAVERY (oppression by the use of overt force) existed at the dawn of history and lasted, with social approval in almost all civilizations, right down to the middle of the nineteenth century. (As forced labor, it still exists in Soviet Russia.) Our own Founding Fathers, as enlightened, scholarly, liberty-loving, and God-fearing a group of males as ever lived, did not question either the religious or political morality of black slavery. In America the institution of slavery was brought to an end only a century ago. And it took the bloodiest war on our soil to do it. Nevertheless—*it ended.*

The oppressed (the enslaved, the politically imprisoned, the exploited, the discriminated against) are oppressed because oppression is to the oppressor's interests, and because the oppressed lack the physical, political, economic, and psychological means to resist and throw them off. The oppressed never free themselves—they do not have the necessary strengths. They become free only when their oppressors lose the strength or the will to oppress them. A white President emancipates the black man. A male Congress grants woman the vote. A male-dominated Congress passes the equal-rights amendment.

The dominating, or oppressor, class relinquishes its position of superiority either when another dominant class collapses it (the anti-slavery white North defeats the white slave-holding South), or when oppression no longer serves the political, economic, and psychological needs of the oppressors.

TODAY IT IS CERTAIN that the centuries-old underlying culture of male supremacy no longer serves *man's* best interests, if for no other reason than that the political and economic arithmetic of sex-discrimination, like the arithmetic of slavery, is increasingly written in red ink. And although the majority of men are not yet themselves aware of it, there are many evidences that the superior male–inferior female relationship is no longer serving their psychological needs. The American male is not yet ready to take his foot off the female's neck. He has believed for too many centuries that that is what nature intended his foot and her neck for. But as a liberal, a humanitarian, and a democrat, he is not really happy in the ancient posture. Nor, he has begun to see, is she. It is not exactly a posture in which she has much of a chance to enjoy her life, her liberty, or the pursuit of her happiness. Also, she has begun to struggle and cry out in anger and in pain. She is not looking up *to* him with the eyes of a loving dog any more. She is looking up *at* him with eyes that are full of contempt for the person who looks down on any other human being as his inferior.

Altogether, the psychological satisfactions are going out of the scene. But it may take him another 50 years to admit it. A hundred years from now she may be on her own feet, in the dawn of the Age of Equality. □

Toward Global Interdependence

The future depends on a system that balances the rights, interests, and aspirations of all peoples. And the sole world machinery is the U.N. itself.

by Kurt Waldheim

One of the most unfortunate aspects of modern society is the increasing tendency to see problems solely in immediate terms. We are fascinated and obsessed by the suddenness and drama of events; we seldom look deeply into their causes, and hardly ever into those elements which could lead to future crises. Yet the Roman adage that great disputes often result from small events but never from small causes remains absolutely valid. The majority of the great issues that confront mankind are profound, complex, and, above all, long-term problems. They cannot be resolved swiftly or dramatically; they are closely interrelated; and they bear directly upon the lives of all. For the great problems are the global problems, and they require a concerted global approach.

It is this fact of global interdependence which is the dominant reality of our time, and it will become increasingly so over the next 50 years. And it is this fact that gives a far greater significance to the United Nations, now approaching its goal of full universality, as the only global machinery for problem-solving that mankind has created. For—and this is a point which is inadequately understood—the United Nations is essentially a long-term organization.

If the potentialities of this unique and remarkable human experiment are to be fulfilled—and the alternatives are grim and menacing—it is vital that we assess its strengths and weaknesses, its achievements and failures, so that, in looking to the future, we make full use of the accumulated experience of the past.

When the United Nations Charter was signed in 1945, at the end of World War II, it was natural enough that the main anxiety of the community of sovereign states, as it then was, should be the maintenance of international peace and the building up of international machinery to deal with aggression and to achieve disarmament. But the victorious alliance which, as represented by the permanent members of the Security Council, was to be the keystone of this design was soon divided by new rivalries and a pattern of antagonistic military pacts. The development of new weapons of mass destruction basically changed the nature of war and of great-power relations. The classical form which aggression had taken in the Thirties gave way to other ways of establishing spheres of influence which were not susceptible to international military enforcement action as foreseen in Chapter VII of the Charter, even if it had been possible, in the prevailing political situation, for the Security Council to agree on such action. In such a climate, efforts to achieve significant disarmament were also doomed to failure.

These developments soon caused the mood of optimism in which the United Nations had been conceived to give way to one of deep disillusionment and cynicism over its political potential in particular, and over internationalism and international cooperation in general. In retrospect it may be said that both the original optimism and the ensuing pessimism were excessive and resulted in considerable degree from a lack of public understanding of the realities of both national and international politics.

Collage by Judith Adel
Photographs: U.N.

In fact, even at a time when much of the political activity of the United Nations, and especially of the Security Council, was frustrated by the rivalries of the Cold War, the Security Council was able to do useful work in a number of serious crises. Peacekeeping mechanisms based on consensus and voluntary cooperation were successfully impro-

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An Austrian, Kurt Waldheim is the fourth Secretary-General of the United Nations.

"These imperatives must persuade the nations—at a late hour—to unite their strength, not confront. . . ."

vised in a series of conflict situations, the first of these being the military-observer groups supervising truces and armistice lines in the Middle East and Kashmir. The process which has come to be known as peacekeeping, although not specifically described in the Charter, eventually became a new and hopeful international institution and has served well in a number of later situations. The establishment of a U.N. Emergency Force in the Middle East in October 1973, with broad political support and a wider geographical representation, marked an important advance in U.N. peacekeeping that augurs well for the future.

ANOTHER IMPORTANT pragmatic development in the political life of the United Nations is the increasing use of the organization, and the contacts that can be established within it, for preventive diplomacy. The essence of this activity is its confidential and unpublicized nature, for its object is to find ways out of difficulties without committing those concerned to taking public positions which tend to freeze the possibility of compromise and settlement.

A recent example of how the Security Council, the Secretary-General, and his representatives, cooperating with the governments concerned, assisted in avoiding a conflict situation can now be made public. It is worth describing as a case history of the potential of the political processes of the United Nations.

In February 1974, serious incidents occurred on the frontier between Iraq and Iran that involved loss of life, concentration of forces, and countercharges between the two nations. The matter was taken to the Security Council. As a result of intense private negotiation, the council adopted a consensus requesting the Secretary-General to appoint a special representative to conduct an inquiry into the events leading up to the border incidents. On March 7 the two parties had agreed to a cease-fire, but the heavy concentration of forces remained—at some points only between 80 and 150 yards apart—and the situation was tense. My special representative, Ambassador Weckmann Muñoz, went to Baghdad and Tehran, and, with the full cooperation of both governments, undertook extensive field trips to see for himself the area where the incidents had taken place and had detailed discussions with representatives of both governments. As a result, the governments agreed to a strict observance of the cease-fire; to a prompt and simultaneous withdrawal of the concentration of armed forces along the entire border; to a total refraining from any hostile actions; and to a resumption, without any preconditions, of conversations with a view to a comprehensive settlement of all bilateral issues. This outcome was endorsed by the Security Council. It is perhaps also relevant to note that, because a peaceful solution was reached, the successful outcome of this important mission passed virtually unnoticed in the world at large.

Much more could be said about the way in which the member states of the United Nations have developed the concepts of the Charter in evolving new means of maintaining international peace and security. Unfortunately, the failures tend to be more newsworthy than the successes, but I firmly believe that far more has been done in this infinitely difficult area than is generally realized, and that the combination of bilateral diplomacy and the multilateral efforts of the United Nations, of which current developments in the Middle East are an outstanding example, is a most promising development, which, in the perspective of history, may prove to be of great importance in shaping a more effective world order.

IN THE AFTERMATH of World War II, historic forces were at work, which in 30 years have radically changed the political map of the world and have had a profound effect on the nature and work of the world community represented in the United Nations. The decline of European colonialism and the accelerating process of decolonization brought to independence scores of states and, in a period of less than 30 years, have swept away all but the last remnants of colonial domination. Perhaps for the first time in history we now have a world predominantly composed of free and independent nations.

This development in turn produced a new emphasis in the United Nations on assistance in economic and social development—an effort to bridge the gap between rich and poor on the international level. In fact this activity in its various forms comprises an overwhelming proportion of the overall effort of the U.N. system in terms of manpower and money. International resources to combat poverty, starvation, disease, and widespread unemployment in developing countries have always been terribly small in relation to the vast problems involved. Attempts to bring about changes which together would form the basis of a new world economic system, as for example the U.N. Conference on Trade and Development, have also hitherto tended to be frustrated by the conflicting interests of different groups of states. However, we now face the new imperatives of accelerating change, increasing interdependence, and the evident need to evolve a new and coherent economic and social system which can deal justly with the worldwide and interconnected problems of mass poverty, population, food, energy, military expenditure, and inflation. These imperatives may, and in my view must, persuade the nations of the world—at a very late hour, to be sure—to unite their strength rather than to confront each other in pursuit of short-term goals.

What has now become clear is that the shape of a future economic and social order is no less vital to the maintenance of peace than to the larger question of the sort of life which future generations will lead on this planet. In fact, it is no longer possible to make convenient distributions among political, social, and economic questions. Our future on this earth will depend to a large degree on our ability to develop a new economic and social system which recognizes and balances the rights, interests, and aspirations of all peoples. This is a problem of such magnitude and complexity that it can only be dealt with by a degree of global cooperation far greater than anything we have hitherto achieved.

The U.N. system, through its efforts to tackle such basic matters as poverty, population, food, the law of the sea, international trade and development, the monetary system, the conservation and just apportionment of natural resources, and the preservation of the environment, has slowly begun to face up to this urgent challenge. Recently, in the special ses-

(Continued on page 122.)

THE OTHER SIDE OF THE GIANT

Suppose, for a moment, that you're a writer. You are to produce an article about Pittsburgh. You want to tell about the remarkable things that have been happening in that city. How do you begin?

The usual way is to start out with all the things that were wrong with Pittsburgh before 1949. That lays the background for the transformation that began around 1949. Then you tell the story of the partnership between Richard K. Mellon, Republican banker, and Mayor David L. Lawrence, Democratic politician. How they helped organize business, professional, civic, and political groups for a crusade. How they supported the forces that abolished smoke from the skies and pollution from the rivers; built an airport, expressways, downtown parking, and dams to control the floods; rebuilt the Golden Triangle; and diversified industry.

It's a good story, and it's an easy way to get the piece started, but it doesn't say much for Pittsburgh in 1974. In fact, that is the wrong approach.

It is wrong because it's pointless to emphasize faults that have been corrected and imperfections that have disappeared. It's futile to keep on fighting a battle that has already been won.

Several dozen national magazines have published articles on the Pittsburgh Renaissance. Delegations from all over the world have come to study what Pittsburgh has done and how it has done it. Everyone who knows anything at all about Pittsburgh knows that the city was turned around — in spirit and in fact — after World War II. If the others don't know it by now, they possibly never will.

Fortune Magazine, in February 1947, posited the situation bluntly: "Pittsburgh is the test of industrialism everywhere to renew itself, to rebuild upon the gritty ruins of the past a society more equitable, more spacious, more in the human scale."

Engineering News Record did one of the finest pieces on November 19, 1959. By that time the returns were in on the Pittsburgh Renaissance. Everyone knew that it was a sensational success. *ENR* clinched it: "Except for a few war-devastated cities in Europe, probably no city in the world during the past decade has altered its physical pattern and appearance as much as Pittsburgh . . . More than any other U.S. city, Pittsburgh has demonstrated how a community on the downgrade can arrest its slide, reverse the trend and build anew.

"Pittsburgh is a shining example of what engineering planning, political leadership and business support can do to initiate and carry out a program of reconstruction and development . . .

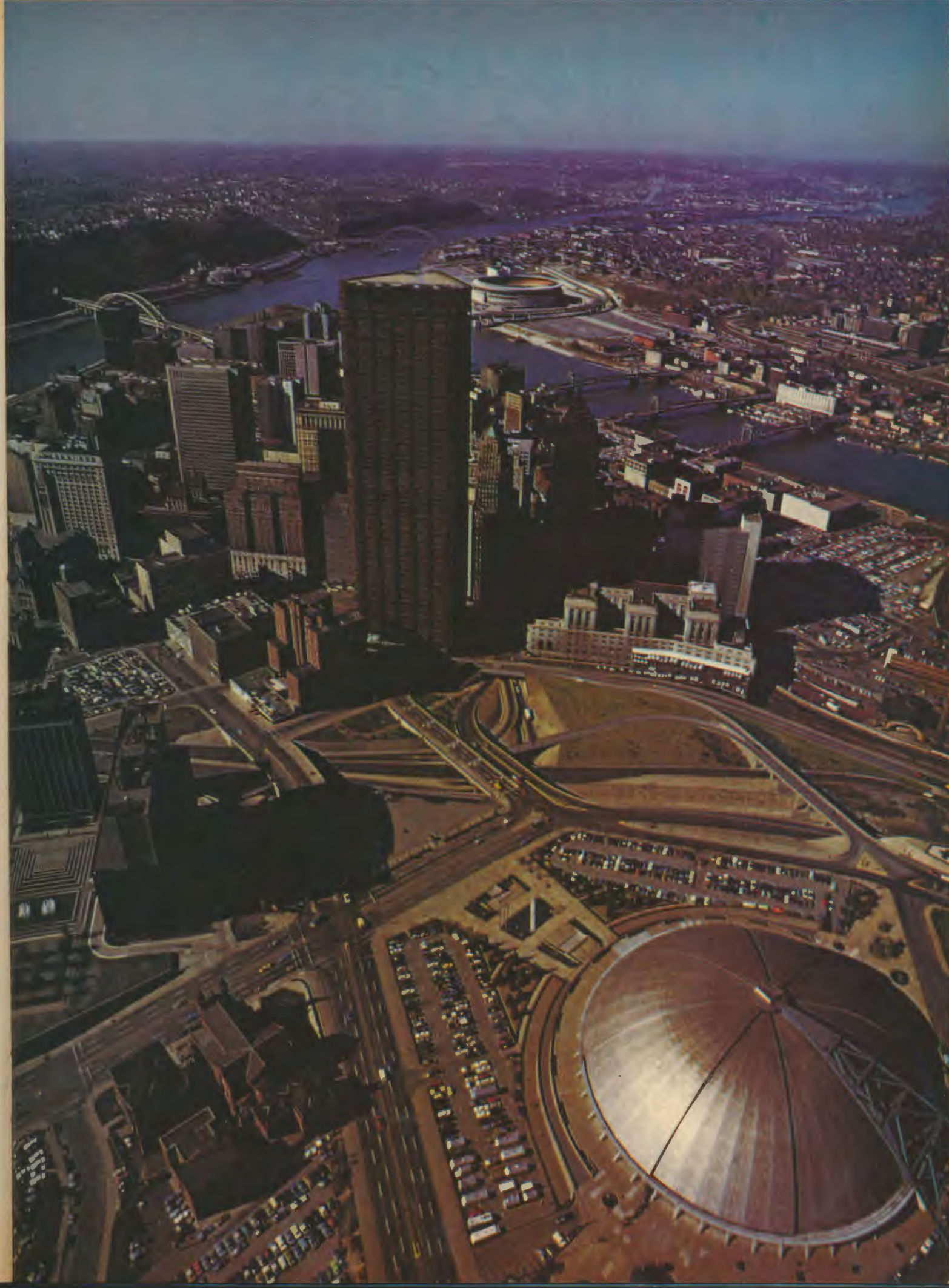
"Pittsburgh progress is an accomplished fact. And it is more: It is the precedent all America needs to prove that any city worth its salt can find the way to rebuild, to fit itself into the future."

Now other American cities have had their Renaissance programs, many of them with outstanding results. Pittsburgh was the first to do it and showed the way. But what is important is what is now. How are things in Pittsburgh today?

The original Pittsburgh Renaissance was basically a building and rebuilding program, beginning at the one-square-mile wedge-shaped area of the Golden Triangle. There was always the belief that the spirit of the city and region would flourish with improved physical facilities; but what is happening in the 1970's is exceeding anything that even the most optimistic planners envisioned. Pittsburgh, the industrial giant, the community that is second in the nation in control of invested capital and third in the number of large corporations headquartered there — Pittsburgh is showing another side. There has been an astonishing flowering of cultural activities — in the arts and crafts, in music, entertainment, ethnic festivals, community programs, participating and spectator sports.

Through the trees this incline provides a spectacular view of the Golden Triangle, historic Point State Park and Three Rivers Stadium.

An aerial view portrays a Pittsburgh of beauty and architectural design.



The American Wind Symphony entertains from its floating stage which is located downtown.

Excitement of white water is nearby.

Here are some of the things you may not know about Pittsburgh, and some of the evidence of these new developments. Pittsburgh:
— is one of the world's quietest cities. (That's because high-speed through traffic is diverted from the downtown area.)
— has more downtown greenery than almost any other American city. (That's because of the hills on each side of the Golden Triangle.)
— has put up 28 major new buildings in the Golden Triangle, including the architecturally daring 64-story U.S. Steel Building, tallest between New York and Chicago. (The buildings have plenty of open space around them where a person can sit down on a bench and rest his feet, unlike some other cities that it would be unkind to name.)

Folk festivals highlight Pittsburgh's ethnic diversity.

— has a top-ranking symphony orchestra with the largest endowment of any in the country. (It plays in the new Heinz Hall for the Performing Arts, which is acoustically perfect, architecturally stunning, and easily accessible. Heinz Hall is also headquarters for the Civic Light Opera, the Pittsburgh Opera, and the Pittsburgh Ballet Theatre.)
— has just built a $12½ million addition to the Carnegie Museum-Library-Music Hall-Fine Arts complex . . . the Scaife Gallery. It will house a superb newly acquired collection of art.
— has 1,311 bridges, two incline railways up Mount Washington, boat

rides around the city, water skiers on the rivers, marinas along the shores, and fishermen at the Point.
— is a big-little city that is easy to get in and out of. (Generally 30 minutes or less from office to home.)
— has more golf courses per capita than any other

region in the United States.
— abounds with close-by hunting, fishing and hiking areas as well as with many public and private tennis facilities.
— has the only Twilight Zoo in the world in combination with a zoological complex rated one of the ten best in the nation.
— has a flourishing riverbank program. (The downtown area is one of the few in the nation where you can walk down to the river and put your hand, a foot or a fishing pole in the water.)
— is the only city that has six colleges and universities within five miles of each other. (There are 30 in the area.)
— pioneered the International Poetry Forum and the famous Pittsburgh International Exhibition of Contemporary Art at Carnegie Institute.
— requires fewer dollars to maintain a lifestyle than a majority of American cities, according to a recent economic survey.
— constructed a 15,000-seat Civic Arena at the base of the Triangle, with a domed roof that opens and closes.
— completed a new Three Rivers Stadium just across the Allegheny River from downtown, with 52,000 seats — home of the Pirates and Steelers.
— has developed 3,000 middle and upper income apartments in or on the edge of downtown.

Early morning finds golfers on a fairway within sight of the city.

Heinz Hall for the Performing Arts reawakened downtown Pittsburgh as a center for evening diversion.

Beautiful Heinz Chapel on University of Pittsburgh's busy, metropolitan campus.

Many non-residents are unaware of these and other examples that show the other side of the Giant. From football and baseball to music and art, from hockey and basketball to ballet and poetry, from skiing and boating to operetta and

The new Scaife Gallery, Museum of Art, Carnegie Institute.

rock concerts in the parks, it's all in the Pittsburgh area.

These elements have mixed, fermented and worked a change. People now crowd the downtown streets at night. Some 15 night clubs and restaurants opened in or near the Triangle's gas-

Old Economy — reflecting life of the mid-1800's — is one of many historical sites that please visitors and residents alike.

lighted Market Square.

In September 1971, Heinz Hall for the Performing Arts was dedicated in the heart of the Golden Triangle. This grand facility further enhanced Pittsburgh as a place to be enjoyed at night by all.

For work, for entertainment, for fun, for culture, for sports — Pittsburgh is "Some Place Special."

In April 1973, Cleveland's *Plain Dealer* sent a reporter to Pittsburgh to study the almost unique phenomenon of busy streets at night in the business district. He headlined his story, "More Evidence of Renaissance — Downtown Pittsburgh Has Life at Night."

The Renaissance of the Pittsburgh area con-

More than 20,000 scientists, technicians and engineers are busy in research here.

tinues. In fact, the Allegheny Conference and Penn's Southwest Association, two agencies created and operated by leaders

Aqua Zoo shares limelight with Children's Zoo and Twilight Zoo at Pittsburgh's zoological complex.

of the community, are working and planning for the years to 2000, when there will be 41% more jobs than there are today, a doubling of employment in education and an ever-improving quality of life which will take place without the dislocation of an overwhelming increase in population.

In one of its last editorials, on October 29, 1971,

The Three Rivers Art Festival fills the Golden Triangle with artists, artisans and fascinated visitors.

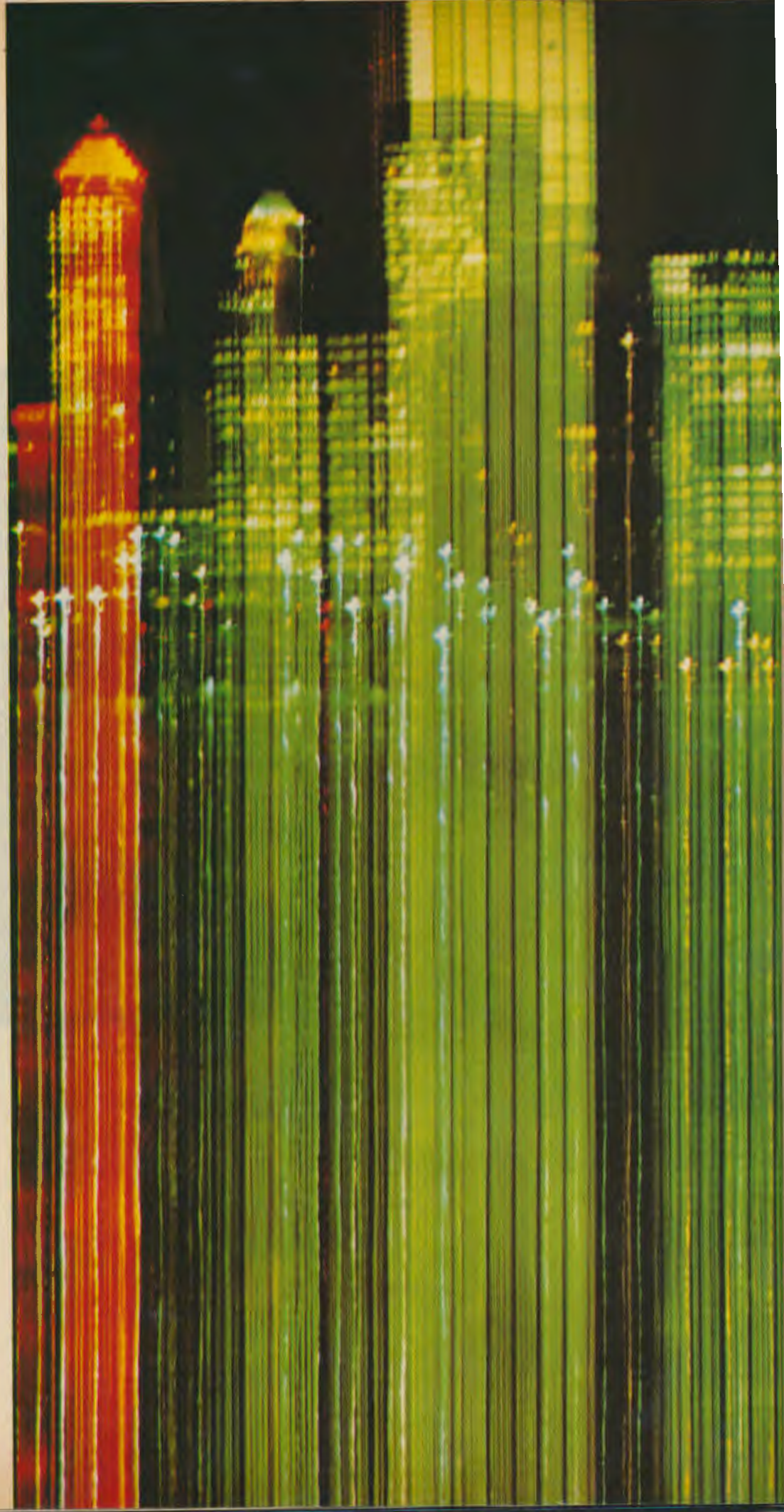
Life Magazine observed that Pittsburgh's downtown was clean and comparatively free of crime, and it wrote, "If there are ways to turn the inner city neighborhoods around . . . Pittsburgh may be the first city to find them . . . The region now has a rebuilt heart that offers identity to even the most far-flung suburbanite.

"The heart beat is getting stronger."

Pittsburgh is a beautiful city at night as well as day.

Article by Robert Dickey III, President of Allegheny Conference on Community Development.

Allegheny Conference on Community Development
Allegheny Ludlum Industries, Inc.
Aluminum Company of America
The Bell Telephone Company of Pennsylvania
Blaw-Knox Company
Columbia Gas of Pennsylvania, Inc.
Consolidated Natural Gas Company
Consolidation Coal Company
Copperweld Corporation
Cyclops Corporation
Dravo Corporation
Duquesne Light Company
Equibank N.A.
Equitable Gas Company
Fisher Scientific Company
Gulf Oil Corporation
H. J. Heinz Company
The Hillman Company
Jones & Laughlin Steel Corp.
Joy Manufacturing Company
Koppers Company, Inc.
Mellon Bank N.A.
Mine Safety Appliances Company
National Steel Corporation
PPG Industries, Inc.
Penn's Southwest Association
The Peoples Natural Gas Company
The Pittsburgh & Lake Erie Railroad Company
Pittsburgh National Bank
H. K. Porter Company, Inc.
H. H. Robertson Company
Rockwell International
The Shenango Furnace Company
Union National Bank of Pittsburgh
United States Steel Corporation
United Steelworkers of America
Westinghouse Air Brake Company
Westinghouse Electric Corporation
West Penn Power Company
Wheeling-Pittsburgh Steel Corp.



Report to the President of the United States From the Chairman of the White House Conference on Education, August 1, 2024

by Harold Howe II

The President
The White House
Washington, D.C.

Madam President:

The White House Conference on Education, which you assembled to report to you and to the American people on their schools and colleges, has resulted in the liveliest conversation in Washington this past week. Only two things can be said with certainty about how teachers, parents, professors, students, college presidents, and self-appointed experts feel about American education—they see both progress and problems, and they don't always agree about which is which. The best I can do to respond to your request for a brief report is to give you some highlights.

Competition Versus Cooperation as a Basic Principle in Education

The hottest controversy of the conference was almost theoretical or philosophical—the sort of thing people get steamed up about because it involves their beliefs and values. Simply stated, it is the issue of whether competition or cooperation should dominate the schools and colleges of the country.

When you and I were in school 40 years ago, striving for the highest marks was our goal. We wanted to attain excellence, to win a fellowship, to get into medical school, or otherwise to do better in education so that we could do better in life. But many of the people at this week's conference, particularly the students and younger parents, were arguing that competitive motivation is destructive, and they were testifying in favor of cooperative values and practices in schools and colleges.

These young people are powerfully influenced by the "controlled growth" viewpoint that began gaining recognition in the Seventies. They argue that rather than competing to see who can get the most for himself or his country, mankind must learn to share the resources it has. They are strongly internationalistic in their views, and they translate these principles into the everyday affairs of the colleges they attend and the schools they want for their children.

In the schools and colleges where the thinking of the younger generation prevails, the traditional values have changed. The student who is proficient at reading or mathematics or who does accurate and high-quality work in the sciences is not necessarily rewarded. The assumption is that he has done well because his particular combination of heredity and environment made that achievement possible. He deserves no recognition for measuring up to his potential.

Anita Page

What the schools and colleges increasingly reward is not the student's own achievement but his contribution to the achievements of others. And the higher his own attainments in learning, the more he is expected to do in helping others to learn.

Under these assumptions, extraordinary developments are evident in some of the country's schools and colleges—by no means all of them, since there is powerful opposition to the views I have outlined. But where cooperation is the theme and purpose of education, we heard well-verified reports of the following:

- Greatly improved levels of learning among the general population—both in basic skills and in knowledge of all kinds.
- Operation of educational institutions at considerably lower costs since everyone in them is both teacher and learner, and fewer full-time, fully paid people are needed to run them.
- Rapid decline in behavior problems, intergroup difficulties, juvenile delinquency, and campus disruptions (indeed, in those institutions where these views predominate, we are finding for the first time an alleviation of the racial tensions that have characterized education for many years).
- Astonishingly productive and friendly relationships between education institutions of all kinds and the neighborhoods or communities that surround them.

The overall effect of this new mode and style of education has been to change its atmosphere completely. While there are still those who hold to the bitter-pill theory of learning—the more unpleasant it is, the better it is for you—they are now in retreat. In many schools and colleges, education is fun and at the same time successful. It is gradually fulfilling the hopes of a futurist who wrote in 1967: "People will increasingly demand the right to study and learn because it will be a source of great satisfaction." But he qualified this with the observation that "it may be impossible for us to accept the idea that learning can be enjoyable, that it should not entail frustration or boredom, punishment or failure, dread, shame, or panic."* None of this implies, inciden-

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Harold Howe II, former United States Commissioner of Education, is presently Vice-President for Education and Research of the Ford Foundation.

*Richard E. Farson of the Western Behavioral Sciences Institute, La Jolla, Calif., in a paper prepared for California's State Committee on Public Education.

tally, that concentration and effort are not important components of the new emphasis in many schools and colleges. They are important and accepted elements of learning.

These developments, which probably characterize close to 50 percent of the schools and colleges of the country, are stoutly resisted in some quarters. The main sources of resistance to an emphasis on cooperation as the overriding value in education seem to be the following:

• *The traditionalists,* who argue that competition is the source of both academic excellence and character development in schools and colleges. While these people admit that a competitive ethic isn't much use in a limited-growth economic system, where it would destructively reward the few at the expense of the many, they are reluctant to accept the concept of limitations on growth. They see such limitations as interfering

The Case for Educare and the Open University

The following report appears as the introduction to a privately funded educational history study recently completed by a group of American historians, educators, and legislators. The study was commissioned in an attempt to counter certain misinterpretations its authors felt had arisen since the enactment of the Educare Act in 2008.

The new educational age started near the beginning of the fourth quarter of the last century. For some odd reason, the revolution first got underway, not in America, which prided itself on being the cradle of progress, but in England, that rather tired, tradition-minded country. In the early Seventies a group of educational iconoclasts, exploiting the politicians' need for a vote-getting issue, created the Open University.

Many respectable academicians said it would never work. "More is worse," they warned. But the British, always tolerant of eccentricity, allowed the Open University people to build a great new campus with everything on it—except students. The faculty, in blessed freedom from undergraduates, created an endless series of courses; reduced them to hundreds of volumes of specially prepared textbooks; produced weekly television presentations for each course, supplemented by instructional radio programs; designed an elaborate system of weekly two-way mailings that sent lessons to students and got the completed assignments back on the campus where computers augmented by live tutors graded them; dotted the country with review and counseling centers where students met at frequent intervals with advisers and counselors; dispatched elaborate science crates to students for home experimentation—and sat back and waited for the response.

Thousands rushed to apply. (No previous educational prerequisites were asked for.) By 1975 enrollments had skyrocketed to 50,000. That year's graduating class—having completed examinations equal in rigor to those of the old-line colleges—exceeded 4,000.

Many observers in Britain and in the United States viewed O.U., as it was called, as the beginning of the end of conventional higher education. They were wrong (we shall see why in a moment) in their short-term predictions, and they were unable to fathom the long-term changes their experiment would eventually bring about in the twenty-first century. Their vision was understandably limited because their eyes remained fixed on collegiate education and on O.U.'s competition with the existing campuses. They merely wanted to allow more people, particularly of the working classes, to get college degrees.

In Britain, O.U.'s success, though numerically phenomenal, fell short of its planners' expectations, largely because the majority of those who availed themselves of the new remote-control education—some 75 percent of the total enrollment—were teachers. Optimistic predictions notwithstanding, workers did not flock to the opportunity to earn their B.A.s.

We discovered an old clipping of *The Financial Times* (February 1, 1974) which suggested that the O.U. limit itself to a secondary role, such as offering "shorter courses attuned to . . . consumer demand." O.U. had failed, the conservative journal theorized, in its wish to become "the electronic conqueror of Oxbridge." Yet in an oddly prophetic aside, *The Financial Times* suggested that, even if its degree courses were not to revolutionize higher education, the O.U. experiment would be worthwhile if it "enables the bulk of its students to appreciate a wider range of life's pleasures. . . ." (Note the similarity of this statement to the preamble of the Educare Act of 2008.)

An added limitation of O.U. as a substitute for Oxford, Cambridge, and even what were then the new Red Brick Universities was too unspeakable for the educationists, let alone the politicians, to admit outright. In the society so well understood by Professor Higgins, simply studying by himself did little for the lower-class cockney. Though he might emerge highly educated, with a full-fledged B.A., he still was afflicted with a lower-class accent. No upward mobility. What the experts called the "socializing" effect was lacking. Only a real campus, and the old school tie, could provide that.

Records show that the initial response to O.U. in the United States was even more dismal. At the time its advocates tried to import it, traditional campuses were beating the bushes for students to fill their classrooms and dormitories. The last thing they wanted was to have tens of thousands stay away to educate themselves at home. (The last thing young men and women wanted was to stay at home, particularly since the co-educational dormitory had just been discovered.)

Yet, it was precisely at that time that higher education in America blundered into a new development that was to give rise to Educare and Educard. (By way of a historic footnote, it ought to be recalled that the term *Educare* was first casually used at an obscure meeting in 1974 by the then-chancellor of the State University of New York, Ernest Boyer, who is reported to have said: "We have Medicare for the body. Why not Educare for the mind?" The audience appears to have been amused by the quaint notion.) American higher education was in a state of panic. Deficits were rising as rapidly as enrollments were declining. A frantic search was on for a new clientele. Almost to a man (women were still virtually excluded from college

with the freedom of the individual—even though that freedom as they define it may become the instrument of mankind's destruction.

• *The organized teachers and professors,* for whom the new patterns of cooperation in schools and colleges clearly mean both role changes in the long run and some loss of job security in the short run. Actually, the teaching profession is split on these issues. Some of its organized elements have made the transition to the new style of education.

• *The teacher trainers,* much of whose accustomed work is threatened with obsolescence by the new cooperative approach. There is growing evidence that the best teachers in today's schools learned their skills as students who were helping others, not in schools of education of the traditional kind.

• *The athletic lobby,* made up of people who help the educational system run the farm teams it pays for on behalf of the

presidencies) the academic leaders suddenly discovered—adults. Recruiters were sent out to entice "mature" students to the campuses.

With some exceptions, the initial attempt to rejuvenate the campuses failed. Historians suggest that, like dinosaurs, traditional deans found it impossible to change the curriculum, the hours, the requirements, or the teaching methods to cater to working men and women, to housewives, sales executives, and so on. (Only grandmothers and the unemployed found it possible to adjust their life-styles to the academic pace and calendar. Suggestions for change were usually rejected as a threat to academic standards.)

To be sure, business and industry published occasional public-relations brochures extolling the benefits of "continuing education," and corporation executives delivered speeches at their own college reunions supporting *in principle* the "further education" of their employees. But in reality and hard cash, the idea of a sabbatical continued to be limited to the only profession whose members had no need to go to college to continue their education—the college professors. The worker or even the executive who took time out was likely to find he had traded "continued education" for a "discontinued job." (Actually, three European countries did start to give industrial workers paid educational sabbaticals—Germany in 1969, France in 1971, and Belgium in 1973. And it was during precisely those years that those countries overtook the United States in the productivity of their labor force.)

The situation did not change until much later—near the turn of the century. It was with the enactment of the two-day work week that the continuing-education movement began to assume its present dominant place in American society. (The four-day week, which began to spread to many major industries in the Eighties, allowed a gradual tooling up; but the novelty of the extra leisure time had not yet sufficiently worn off; it took a decade before people got tired of all that bowling and fishing.)

The stress on productivity that accompanied the ever-shorter workweek, moreover, rendered the skills acquired in college and graduate and professional schools, as well as in vocational courses, obsolete within five years after graduation. (By 2000, only the traditional liberal-arts curriculum was considered permanently "relevant." Harvard's quaint publication, "General Education in a Free Society," originally issued in 1945, was reprinted and has remained a best-seller ever since.)

ALMOST OVERNIGHT the picture changed, not because educators had planned it so, but because economic conditions and unmanageable boredom demanded an answer. The Great Boredom March on Washington alerted Congress. Education was the only hope. All restrictions on the scope of continuing education were ordered removed. The colleges were still taking care of the disbursing of degrees. A long time ago, in the Thirties, an educator named Robert M. Hutchins had suggested that every baby be given a B.A. at birth so that education could subsequently proceed unhampered by the chase after credentials. That idea, however, never took hold and, since youth tenaciously defends its right to four years of escape to the campus, never will.

But ever since the mass of the population began to have five non-working days a week (except only the managerial and professional class, which still—largely for reasons of prestige and self-importance—stubbornly adheres to the four-day week), the only question to be answered remained how to respond to the new education demand and how to finance and organize it.

The presidential-election campaign of the year 2000 was fought almost entirely on these issues. The Democratic candidate ran on an Educare platform. His Republican opponent said that while he, too, was concerned about the scandalously inadequate delivery of educational services, he wanted the matter to be left in the hands of the private insurance companies that, he said, had already done so much to provide protection against catastrophic education deficiencies.

In the end, Educare prevailed. As we all know, it covers the full cost of tuition for all "non-useful" courses, such as Romantic poetry or Renaissance art, to cite examples at random. Tuition for all "useful" courses (the term was adapted from Benjamin Franklin's writings on education) is assessed at the rate at which their study increases personal productivity and income. The Educard holder is billed annually but may defer payments until the additional income registers on his Education-Based Productivity Statements. Within ten years of the system's operation, the balance of edu-payments had begun to be so favorable that it not only covered the cost of all non-useful, esoteric courses but also provided a surplus that is regularly channeled into the support of conventional colleges.

The implementation of this national system of unlimited education, however, would not have been possible without the re-activation of the Open University. The technology had, of course, advanced far beyond the initial O.U. experiment of the Seventies. With computer terminals and two-way communication by sound and picture in every home, the original correspondence-cum-TV approach compares to the present system as the Model T Ford compares to today's low-cost, pollution-free Solarmobile.

FRED M. HECHINGER

Fred M. Hechinger, former education editor of The New York Times, *is a member of the Editorial Board of that newspaper. He is co-author of the forthcoming book* The Impact of Education on American Society.

owners and operators of profit-making businesses in football, basketball, track, and other professional sports. The new cooperative movement in education sees sports as something both men and women do for fun, while most coaches, athletic directors, and their various hangers-on are committed to its spectator and profit-making aspects. They are powerfully supported by a group of college graduates who still see college athletic competition as a source of important values for the individual and for society, in spite of evidence about its damaging effects on both students and institutions.

Education and Work

For a long time, there has been a disagreement about the relationship between education and work. Our conference provided a forum for those who argue that other factors are more important than education in achieving economic success. But their opponents—those who insist that the only way to give the poor and the victims of discrimination a fair chance in life is to give them a fair chance at a good education—got their innings also. We didn't settle this argument, but we did identify a trend in the way those who are enrolled in schools and colleges or who are parents of younger children are thinking about education's relationship to work.

To understand this trend, you'll have to think back 50 years or so. At that time, there was in the United States a considerable interest in what was called "career education." This all-embracing concept covered everything from teaching elementary school children about occupations to training college students for a specific vocation. The central core of the career-education idea was that educational institutions should take more responsibility for helping students to know about job possibilities, to select among them, and to prepare for useful jobs. Career education had a practical, down-to-earth emphasis, and it produced a variety of programs that almost certainly helped students with their personal planning for jobs and with actually getting started.

The trend, or perhaps it is better called the discontent, that appeared in last week's discussion was the suggestion that career education is not enough, that too many students can go to school, learn a skill, get a job, and yet find their lives unrewarding. One reason for this is that a job in today's world constitutes only a small part of the average American's life. The four-day week became universal 20 years ago. Leisure time is still increasing, and the new pattern of ten days of work followed by ten days of leisure is gaining acceptance. People increasingly see education as a source of rewarding leisure-time activities.

Also, as more and more people progress farther and farther in education, there just are not enough jobs demanding the level of training that many of them have attained. The inevitable result is that more and more butchers, jockeys, cabdrivers, office employees, and sanitation workers have B.A. degrees.

Some people at the conference saw the butcher with a B.A. as a problem. Why does he need a B.A.? It cost him and a lot of other people considerable money. Is it a good social investment to pay for B.A.s for butchers? But the preponderant view was that a butcher with a B.A. is a symbol of the relationship that should develop between work and education—quite a different relationship from the one assumed by career education. The new view is that a person's education should not be limited by the work he may do. This proposition came across clearly in our conference discussion. Add to it only the qualification that somewhere within his experience each person must learn to do some work. But he doesn't necessarily have to learn it in school or college—witness the butcher, the cabdriver, and the jockey.

The implications of the butcher with the B.A. are very large indeed. For the individual American, they suggest that education is not a limited service that will help him find a niche in the economy, but rather that it is a wide-open door to all the world that can enrich in countless ways his private existence and his role as a citizen. The implications for education require that education no longer deal with individuals for 12 or 16 years and then forget them. Instead it must find the way to serve them lifelong, having as much concern for their leisure time as for their employment (see the piece by Fred M. Hechinger on the preceding pages).

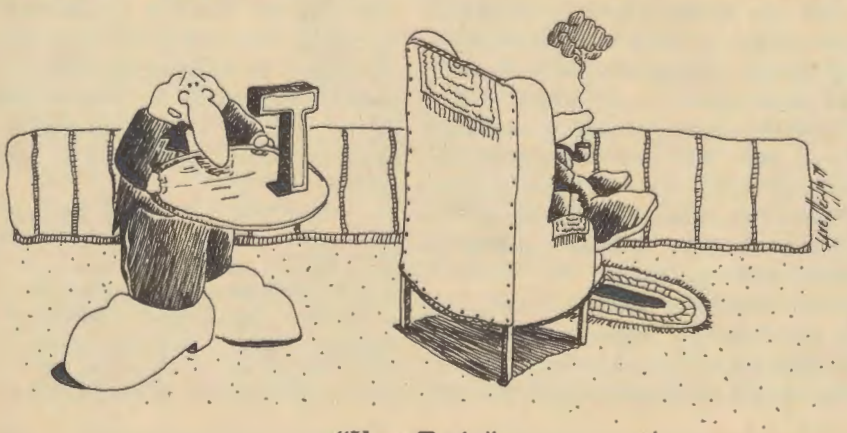
The Health of the Major Research Universities

It will be no surprise to you that this topic was on our agenda. These institutions have had serious difficulties both in financing their activities and in defining their role. Back in the early Seventies, a predecessor of yours contributed to their problems, not so much by the policies and programs he advocated, as by his failure to do anything at all about them. He created a limbo of policy toward high-quality graduate education and research, allowing the institutions on which the nation depends for talent and creativity to flounder. In addition, his advisers took a narrow view of these institutions and rapidly decreased the government's support of them on the grounds that society had no need for the highly trained men and women who graduated.

Luckily the period of floundering was not completely destructive. The universities managed to rid themselves of a variety of costly activities and to enter the twenty-first century lean and hungry but reasonably healthy. Since then, their greatest problem has been to find their place in an educational scene that has been more and more influenced by the values and attitudes of sharing and cooperation discussed earlier.

The traditional professor is not accustomed to having his prestige and status in his field measured by his capacity to stimulate and help his students and colleagues. Indeed, the custom has been to some degree the opposite. The professor

(Continued on page 130.)



"Your T, sir."

Allegheny Ludlum Industries: Jacobsen and True Temper are swinging in the leisure market.

Our Consumer Group has a way of working harder and harder on good times for people with free time. True Temper continues boosting its production of fishing rods and reels, golf club components, gardening tools. Jacobsen keeps producing more power mowers that make care easier wherever there's grass.

A lot of Allegheny Ludlum Steels are on the swing over to leisure, too. Stainless alloys go into boats, cars and planes. As well as into golf carts and campers. Then there's TV watching, helped along by our Arnold Engineering's special magnetic materials. And any day your coffee maker perks, powder metal components are there from our IPM Corporation.

But leisure is just one growth situation at Allegheny Ludlum Industries, where a lot of work and thought go into moving forward in your best interests.

Allegheny Ludlum Industries, Inc., Oliver Bldg., Pittsburgh, Pa. 15222.
Our other key industries: Wallingford, Special Metals, Carmet.

CLIPPINGS FROM TOMORROW'S NEWSPAPERS

News Stories of 2024 by Isaac Asimov

Quarter-Millennial Plans to Feature Nostalgic End of the United States

President to Retain World Post as Regional Governor

Nationalists Plan Demonstrations

WASHINGTON—Last week's congressional vote in favor of the Regionalization Bill, and yesterday's presidential signature that made it law, makes official what has, in the eyes of most political analysts, long been inevitable.

Thirty-three years after the establishment of the Global Economic Board, the reality of national interdependence has overtaken the last political unit still maintaining its traditional twentieth-century boundaries.

"The advance of regionalization," said Vice-President Frances Anna Parkinson, "has successfully reduced the divisions of the world population on racial, linguistic, and cultural bases by setting up units that cross all such boundaries. It is time we joined mankind in geography, as we have in actuality, and we can find no better time for this than on the two hundred fiftieth anniversary of the event that marked the beginning of what was to be the greatest nation of its time."

The Quarter-Millennial Committee, which has long anticipated this vote, is preparing to make the 2026 celebration at once a backward-looking joyous celebration and a forward-looking, equally joyous celebration of the final stone in the structure of global federalism.

Illustrations by Michael Brent

Vice-President Parkinson in the capital.

Jonathan Blackmer, head of the Paul Revere Society, warned bitterly that the American people would never accept regionalization and promised demonstrations of large size.

Lunar Colony Dedicates New Division

With the opening of the Scott Carpenter Tunnel, the total length of corridors in the Lunar subsurface passed the 300-kilometer mark. Estimates are that by the end of the century, there will be 5,000 kilometers of tunnel and a Lunar population of 500,000.

Present at the dedication were all 38 native Lunarites, boys and girls ranging in age from 2 months to 11 years, who were born on the moon.

REMEMBER CHICKENS?

Haym Morris is taking time out from his Dream-Taping sessions to breed chickens. He says it's one way of getting a little of that old-fashioned meat on the table. Don't rush to imitate him, however. Every chicken must be inspected, and you'd better not forget to get an animal-breeding license and fill out information blanks for each chicken you have. And don't think you can fool the computer. You might decide to go back to chicken-flavored pressed-nut-bean loaf.

Of course, if killing chickens is not your idea of fun, you may not have to go that far. Haym says that their eggs are quite edible if correctly prepared.

Jenny, the baby with the glass mother, at her party.

Ecto-Baby Celebrates First Birthday

One year old today, Jenny, the little girl with the glass mother, slept peacefully while tiptoeing nurses placed a cupcake with a single fluoro-candle near her crib, then celebrated with somewhat more vigor in the lobby of the Ectogenesis Institution.

Dr. Warren K. MacMurray, who throughout has supervised the baby's development from sperm and ovum, stated, "There is no question but that Jenny is a normal child in every sense. There is absolutely no reason to suppose she will not live out an entirely normal life."

Questioned as to whether the Glass Placenta is now ready to begin the incubation of Genesis Two, MacMurray smiled and was silent.

Genesis One, universally known as Jenny, is the first test-tube baby to survive more than one month past term. So far, all fertilized ova surviving to term have been female, but there are hopes for male survival soon.

(Sports and Theater News, page 80.)

...AND YESTERDAY'S

From the Press of 1924

compiled by Dr. Helen Vaughn

COOLIDGE WINS BY A LANDSLIDE; SMITH BEATS ROOSEVELT BY 130,000; LA FOLLETTE RUNS A BAD THIRD

President and Gen. Dawes Sure of 334 Electoral Votes, a Majority of 137

Republican Sweep Extends to Pacific

Davis Carries South, Oklahoma and Probably New Mexico; La Follette Wins Wisconsin

BRITISH BOAT SEIZED IN $1,000,000 PLOT TO SMUGGLE LIQUOR

Trap Set by Prohibition Agents Posing as Bootleggers Nets 5,500 Cases Here.

BANKERS SAID TO BE IN IT

Motorboat Owner Gets $1,000 Fee for Bringing Liquor From Trawler.

The British trawler Frederick B:, with a large liquor cargo and crew of twenty, was brought into this port yesterday by the Coast Guard cutter Manhattan, which captured the trawler under the Anglo-American liquor search treaty. Th rawle[r] s de cribed b the F[e]deral

WEISSMULLER BEATS CHARLTON AND BORG IN 400-METER EVENT

American Swimmer Proves His Superiority by Fast Finish in Free Style Contest

By Associated Press

Olympic Swimming Pool, Les Tourelles, France, July 18. The United States [o]l[y]m[p]ic swimming team won four out of the five [fi]nal ever[ts] contested toda[y] and [ha]s

LUDENDORFF'S TALK AT TREASON TRIAL DISMAYS HIS PARTY

German Press Assails Him, Hitler and Other "Putsch" Heroes as Incompetents.

ALL IGNORANT OF POLITICS

By T. R. YBARRA.

Copyright, 1924, by The New York Times Company.

By Wireless to THE NEW YORK TIMES.

BERLIN, March 1.—"Words, words, words." That is the salient impression all over Germany regarding the great trial for treason at Munich of Ludendorff, Hitler and their satellites who took part in the unsuccessful putsch of last November.

The fifth day of the trial has dragged to a close. Ludendorff has talked for hours. So has Hitler. So have others.

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Men's AND Young Men's Palm Beach Suits

Palm Beach — THE GENUINE CLOTH

COAT and TROUSERS $15

Arrived for the hot weather—new Palm Beach Suits. Made to our exacting specifications. The tailoring is exceptional—the coats designed for comfort. The colors desirable and practical for summer wear. Plain Steel Grey. Fancy Grey stripe. Cambridge Grey. Plain Brown. Sand. Heather. Tan. Black and White Pencil stripes.

Regulars, Slims, Stouts, Shorts and Extra Sizes

BOSTON $5.19

Providence $3.60

Steamer leaves Pier 44, N. R. (foot of Christopher St.), weekdays and Sundays at 5 P. M.

State rooms $1.00

COLONIAL LINE

Phone Canal 1600.

(Sports and Theater News, page 81.)

Theater—The New Play, reviewed by Aston Hight

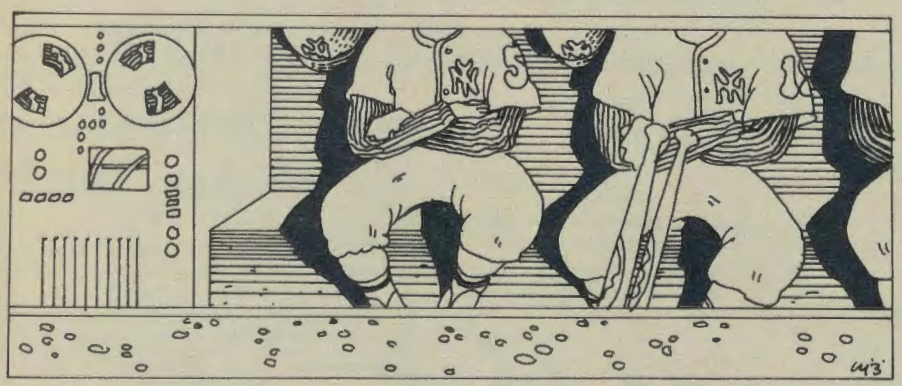
In watching *Watergate*, the viewer is overcome at first by the sheer deadly accuracy of the makeup. It is not only that each player seems like a historical character come to life; the very voices, walk, and even the tilt of the ears, it would seem, bury each man in the part he plays.

The recent television special on the occasion of the fiftieth anniversary of the Watergate break-in introduced many of us to the characters of that impossible drama (as we look back on it) which so changed the current of American history. That, however, was a collection of scraps.

Olmsted's play takes the tapes, transcripts, and TV remnants of those mad days of the Seventies and puts them together in such a way that a connected story arises out of it, one virtually without seams. The action never flags; the suspense never droops. Despite the fact that we all know exactly how it ended, I caught myself more than once thinking, "By God, he's going to get away with it!"

Undoubtedly, Robert Warton, in the role of Nixon, carries off the honors. He can switch from the mean snarl of the staff meetings to the unctuousness of the television addresses without a stripped gear, and yet never loses the telltale furtiveness in the lines about the mouth. Ali Barssom offers strong support as Ehrlichman—underplayed all the way with a deadly sureness of thrust. Jellicoe properly portrays Mitchell's stone face, but Grinspan's Haldeman might have been stronger. At times when he hesitates a bit too long, we don't quite believe in him as the Grey Eminence. Ellenbogen is seen all too briefly in his role of John Dean, but he makes the most of it. When the decision is made and Dean backs out of the office, we can *see* his change in direction.

Mets Meet Tokyo Suns in Opener



Computer in the Mets dugout calculates stats. Tokyo Suns arrive by rocket.

Manager Burleigh Thoms insisted on optimism, but the odds are 7 to 5 against the injury-riddled Mets, who may have to play without slugger Sam Grimmis.

Thoms said, "The computers have been wrong before. They can't predict every lucky hop or just the way a batter feels at a particular moment. The game is still won on heart."

Computer-Odds, Inc., which is short on heart but long on programming, refuses, as usual, to announce details, but a confidential source says that out of over a hundred calculated games, using the batting orders as announced and the lifetime statistics for every player concerned, no outcome gave the Suns less than a three-run lead.

No injuries have been forecast in the probability range above 2 percent. Injury announcements are legally required since Hatchman's broken leg last year, an accident that might have been prevented if he had known its comparatively high probability.

Letters to the Editor

Dear Sir:

Now that the United States is going regional, I suppose we're going to have to carry all the freeloaders of the planet on our good American backs. I dread seeing what the tax bill is going to look like in the next few years. Or who our councilmen are going to be from now on.

Dear Sir:

It's about time the Landmarks Preservation Council took a look at the Empire State Building. It is in a shocking state of disrepair, and there is just no use in keeping one working remnant of the skyscraper era if we let it go to pot.

Personals

Old books for sale; prime condition; many for which no videotape equivalents exist. Girlie magazines, ante-2000, unexpurgated.

Nostalgia buffs! Get your old plastic here. Genuine acrylic, polyethylene, bakelite, all varieties. Beautifully yellowed. Every piece authenticated. Year of manufacture included in guarantee.

Did you know—

- That the last tiger in the wild was found dead on August 17, 2018, in Assam, India?
- That there are estimated to be 2,000 women in the United States between the ages of 28 and 30 who are all named Aurelialee? All are named for Aurelialee Swanson, the first woman to reach the moon back in 1994.
- That over 99 percent of all the computer programmers who ever lived are alive right now?

Obituary

Richard Helmuth Boskone, formerly regional governor of Anglo-Rhineland, died yesterday at the age of 73. Elected to the governorship in 2012, he had served a term of five years.

By training a biochemist, Isaac Asimov is the author of 155 books, many of them on science and science fiction. His forthcoming books include The Best of Isaac Asimov, Asimov on Chemistry, *and* Science Fiction of Asimov.

AMUSEMENTS

ADELE ASTAIRE FASCINATES.

In Tuneful "Lady, Be Good" She Vividly Recalls Beatrice Lillie.

LADY, BE GOOD! A musical comedy in two acts and six scenes. Book by Guy Bolton and Fred Thompson, music by George Gershwin, lyrics by Ira Gershwin. Settings by Norman-Bel Geddes; staged by Felix Edwardes. At the Liberty Theatre.

Dick Trevor.....Fred Astaire
Susie Trevor.....Adele Astaire
Jack Robinson.....Alan Edwards
Josephine Vanderwater.....Jayne Auburn
Daisy Parke.....Patricia Clarke
Bertie Bassett.....Gerald Oliver Smith
J. Watterson Watkins.....Walter Catlett
Shirley Vernon.....Kathlene Martyn
Jeff.....Cliff Edwards
Manuel Estrada.....Bryan Lycan
Flunkey.....Edward Jephson
Victor Arden.....Victor Arden
Phil Ohman.....Phil Ohman
Rufus Parke.....James Bradbury

There is good news to spread among the mourners for Miss Beatrice Lillie's recent untimely departure from these parts. She returned last night, with an added freshness and a previously unrevealed dancing talent, in the piece called "Lady, Be Good" that came to the Liberty Theatre. But this time she calls herself Adele Astaire.

It should be explained, probably hastily, that it is a known fact that the Misses Lillie and Astaire are two different person and that Miss Astaire is not exactly a newcomer. But Miss

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GIANTS DEFEAT SENATORS IN OPENER, 4-3; 40,000, INCLUDING COOLIDGE, SEE JOHNSON LOSE A THRILLING 12-INNING STRUGGLE

H. R. H.
THE
PRINCE OF WALES
says: "MY MOST VIVID IMPRESSION OF AMERICA IS
WILL ROGERS"
Who, to quote the Prince, is
"A GREAT MAN"
ZIEGFIELD FOLLIES
NEW AMSTERDAM THEATRE
Erlanger, Dillingham & Ziegfeld, Mg. Dir.
DON'T MISS HIM

SELWYN
REDUCED PRICE MATS. THURS. & SAT.
MONDAY, DEC. 1st
GALA ANNIVERSARY
CELEBRATION
963741 469 TIMES CAPACITY
PEOPLE HAD THE LAUGH OF THEIR LIVES.—YOU CAN'T AFFORD TO MISS
EDDIE CANTOR
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Special to The New York Times.

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Transcontinental Air Mail

The transcontinental air mail service is operated in both directions daily, leaving Hazlehurst Field (New York) at 10 A. M., Eastern Standard Time, and San Francisco at 6:30 A. M., Pacific Time. The planes carry mail for intermediate points as well as including Cleveland, Chicago, Omaha, Salt Lake City, &c. Mail for points not on the air route is forwarded by mail trains from the nearest air mail station.

The New York daily closing time for this mail is 8 A. M., Eastern Standard Time, from the General Post Office, and 11 P. M. the previous night, or a little later, at the air mail letter boxes painted red, white and blue, which are located in various parts of the city. The closing time at the box in Times Square is 11:25 P. M.

Saturday's transcontinental air mail from San Francisco will arrive in New York at 1:30 A. M. today by train.

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ESSEX coaches, some overhauled and repainted, sold with new-car guarantee at greatly reduced prices. Hudson Used Car Dept., 1,771 Broadway, at 57th St. Circle 6830. Open evenings.

ESSEX coach, 1924; like new; sacrifice. Scott, 138 West 52d. Circle 3222.

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William Blake: Bettmann Archive

Will There Still Be a God?

by The Reverend
Theodore M. Hesburgh, C.S.C.

The easiest snap answer to this question is that if there will be no God in 2024, there isn't one now, either. Or, the other way around, if there is a God now, God will exist 50 years from now and 50 million years from now also, for that matter.

The question is not new. In fact, it might be called the perennial question. In the Middle Ages, over 700 years ago, Thomas Aquinas began one of the greatest theological compendia of all time by asking the question: *"Utrum sit Deus?"* ("Is there a God?") And he answered in his customary fashion: *"Videtur quod non."* ("It seems not.") Then he gave several good reasons supporting the negative position, better reasons, incidentally, than most atheists allege today. He next formulated his famous five reasons for the existence of God. I am not sure that those five reasons would be very cogent to many people now. Not that they are not good and telling reasons, but they are fundamentally metaphysical, somewhat alien to the modern manner of thought, which is substantially more shallow and less logical in matters philosophical and theological.

One would almost have to translate Thomas Aquinas today from Latin into English, into modern-thought style. This approach has been tried on occasion—without great success, I might add. It goes something like this: everything that is has some reason for being. In a world of finite, nonnecessary beings, some of which explain the existence of others, ultimately, at the end of the chain of causality, there has to be a Being that needs no explanation, or all the rest are unexplainable. This Being must be an Infinite, Eternal, Necessary Being—the only possible explanation of a world full of beings that are finite, temporal, and contingent.

About this time, someone will say, "You lost me on the last turn," which is not to say that this is not a good argument. I happen to believe that it is one of the truly great arguments, but it does require a metaphysical cast of thought not all too popular today in a world given more to the existential than essential, more to transitory impressions and feelings than to the consideration of substance and eternal truth. This observation sounds snide, even supercilious, and I'm sorry about that.

Even so, God's existence does not depend, thank God, on Thomas Aquinas's arguments or on their power to convince modern man. In many ways, each one of us has his or her own arguments for God or against Him. The fact of the matter is that man has always had an innate sense for perceiving God in the widest variety of ways—some beautiful and some foolish, some transcendental and complicated, some simple and earthy. Man's perception of God is involved in his deepest consciousness of himself, of his immortality, or at least, in his yearning for a life beyond death. God seems to speak to man in his conscience, in his perception of good and evil, in his inner shame and guilt about the evil he does—even though no one knows of it but himself—in his instinct that Someone knows and that ultimately Someone rewards and punishes. But even though the notion of God is tortured and twisted in man's perception of evil and his place in creating it—or God's in allowing it—God comes through to man more strongly in man's yearning for what is best in him—the lifelong search for truth that gives meaning and direction to life in this world of false features and superficial allurements. The constant effort of most men and women to seek the good as they perceive it, despite a thousand failings, false starts, and thwartings of their best hopes for themselves. And, ultimately, in the glow and glory of all the beauty that ever surrounds us in the worst of worlds. The heroism of a few, the moral victories over monstrous evil by those who seem weakest in a physical sense, the stars at night, and the dawning of each new day—all of this somehow has always spoken to men and women of God—and I trust it always will. Often we perceive God in the dark of night when we are most alone with our thoughts, when we ask ourselves, What is it all about, who am I, how did I come to be here, where am I going?—not just tomorrow morning but also that long eternal tomorrow. These are the ultimate questions that lead many to God in a very personal way.

THERE ARE DOCTORS who still stand in awe before life and death and sense a power far greater than their own. And beyond the phenomena scientists study in the innermost heart of the atom or in the billions of galaxies of the universe, they see something more than just ran-

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The Reverend Theodore M. Hesburgh, C.S.C., is president of the University of Notre Dame.

The Mission of Rocky Aoki

When Rocky Aoki, owner of Benihana, came to America about ten years ago, this was how a great many Americans felt about Japanese food:

(1) It wasn't as good as Chinese food.
(2) It was mostly sukiyaki and soup that tasted like hot brown water.
(3) If you ordered anything besides sukiyaki, you'd wind up with raw, slithery fishy things.
(4) OK, the food was very prettily arranged. But you walked out twice as hungry as when you walked in.

"My task is clear," said Rocky. "I'm going to change the way Americans think about Japanese food. I'm going to introduce hibachi cooking to America."

(Hibachi cooking or cooking on a grill, is nothing at all like the highly stylized classical Japanese cuisine.)

And so, in 1964, Rocky opened the first Benihana. It broke all the rules. You couldn't get sukiyaki there. Or raw fish. There wasn't even a conventional kitchen. You just sat around this big hibachi table—a combination grill and dining table—and waited for your chef to appear.

When he did, he came bearing a feast. Basket upon basket of beautiful fresh meat, poultry and vegetables. Then, right in front of you, he sprang into action. Slicing, seasoning and cooking, he prepared your meal with a speed and skill bordering on wizardry.

It was hard to believe. No exquisitely carved carrot slices. No wispy vegetables arranged in perfect flower patterns. Instead, solid food in abundance. Jumbo shrimps sauteed with lemon. Succulent chunks of steak. Young chicken dusted with sesame seeds. Mushrooms, scallions, beansprouts—served not together in some kind of mish-mash, but individually. It was enough to bring joy to the most jaded gourmet, bliss to the most ravenous appetite.

Well, the first New York Benihana was an enormous success. Within a year, Rocky had to open another one. That too became a smash. Soon Rocky was opening a Benihana in Chicago. And then one in San Francisco. And then another in Las Vegas. Today Rocky has Benihanas all over the United States.

When he opened his third New York Benihana—the Benihana Palace—Rocky Aoki declared: "I'll consider my mission accomplished when everyone in America has tried hibachi cooking at least once."

Come in and give a nice Japanese boy a break.

BENIHANA of TOKYO
No slithery, fishy things.

New York, Atlanta, Boston, Fort Lauderdale, Harrisburg, Chicago, Denver, Bethesda Md., Bala Cynwyd Pa., Seattle, Portland, Ore., San Francisco, Las Vegas, Encino, Beverly Hills, Marina Del Rey, Miami, Houston, Scottsdale, Honolulu, Tokyo, Toronto.

"Why question belief in God 50 years from now? We are so inured to change, some think God may change."

dom happenings. Because if God is a rational creator, He created a cosmos, not a chaos; and if He is free, He might have created millions of other ones besides this one we study. In a sense, it was this Western perception of God as reasonable and free that undergirded the birth of science's search for orderly laws and its procedure of prior rational hypothesis and verification by experiment with things as they are.

ONE FINDS such a cornucopia of perceptions of God—some primitive, some sophisticated, some instinctual—that everyone really ought to make up his own list of Godly perceptions.

Those who have written best about God are the great saints and the mystics, the holy ones who took time to speak with Him—assuming that He exists—and especially took time to listen to what He had to say to them—a deeper form of prayer. Some may say a form of self-delusion, but this is not so easily said if one has taken time to read what they have written and has sampled the East as well as the West, the ancients as well as the medieval and moderns.

One can perhaps best get a sense of the continuity of this human experience of God by standing at one of the archaeological digs above the Arctic Circle on the Kobuk River in Alaska. There, in difficult and cruel surroundings, the late Professor Gliddings of Brown University dug his way through eight centuries of human experience. At every level he found a different version of the same story—some charred wood, some primitive shelter, some remains of food, some burials sprinkled with red ochre—symbolizing the struggle to maintain life and the hope of immortality after death.

If one sifts through the little that is known of the long history of mankind, one recurrent theme is fairly obvious: a belief in God. The expression may take a thousand forms, bear myriad names, but the reality is there. One can say that the true burden of proof should be with those who assert that there is no God. They have always been in the minority and, today, when more people now live on earth than ever before—belief in God is still the majority opinion.

One might then ask, Why question the continuity of this belief in God 50 years from now? I suppose that we are so inured to constant cataclysmic change in our times that it occurs to some that God may change, too—although He is, by definition, the changeless who alone explains the ever-changing. It is true that our perception of God is constantly changing. A primitive society attributes all too much to His divine action; a sophisticated technological society, all too little. Here is a problem of equilibrium, not of substance.

But the nagging thought remains: if many of the actions that primitive man attributed directly to God have been proved by science to have more proximate, natural causes, could not science in time explain *everything*? This fear was expressed to me recently when a high school student, attending an International Science Fair at Notre Dame, approached me shyly after my keynote speech on "Science and Technology in the Service of Mankind" and asked:

"How can you square all of this with God?"

"Do you think we're putting God out of business?" I countered.

"Well, kind of," he said. "Can He be important if all this science and technology does so much?"

"Do you worry about Genesis?" I asked, adding yet another question.

"Yes," he said. "What can it possibly mean?"

"It means," I said, "that He started it all off, not taking Genesis literally as so many specific creations, in so many days, but rather the spectacular truth that He created something out of nothing, a large bang of energy, a kind of super-super nova, involving the simplest form of matter and energy—hydrogen—and then all the rest, up to and including us in time, and probably a lot more we don't know about even yet. He's important, the most important of all, because it had to get started, and it has to follow a rational course of development; and in our own small way, we have a creative role now, too, because we are the only ones (barring angels and other creations we may not yet know about) who share what is best in Him—intelligence and freedom. These personal powers remain our best means of naturally finding Him and serving Him, by mastering this world, which He saw to be good, and by putting it to the good service of His creatures. We're doing a lot less than that right now, messing up the world by pollution, ravishing its natural beauty, using the power we've discovered to destroy, rather than to feed and house and clothe, mankind, and worse yet, dehumanizing men and women rather than working for their dignity and development and well-being."

Finally, he asked, "You don't see science and technology as the enemy of belief in God?"

I started to say, "Quite the opposite," but then thought it would be better to give him a personal experience—often it means more than flat statements. Back in 1954 I was a young theologian and philosopher, having spent the better part of my university life either studying or teaching these two subjects. President Eisenhower asked me to join the National Science Board, and for the next 12 years I spent much more time discussing the frontiers of science and technology than I did theology and philosophy. It occurred to me that this immersion in modern research projects might challenge my faith in God and His Word as we find it revealed in the Bible.

My faith never wavered. Rather, the more I learned about the world of science and technology, the more I saw the need for belief in God and His Word if mankind were ever to use this new knowledge and power for its own good and not for its ultimate destruction. Science tells us how the world is and how it operates, not how it began. Science neither supposes, nor denies, God's existence—it merely studies what is, as we find it. Philosophy and theology alone can tell us how the world came to be this way, what values should govern the use of the power that science and technology give us, what the destiny of man and this world ultimately is. Science and technology are morally neutral. It is the scientist and engineer who are good or evil, depending upon how they use their knowledge and power, well or badly. After all, it was a great scientist, J. Robert Oppenheimer, who said after the holocausts of Nagasaki and Hiroshima, "The scientist has now known sin." Indeed he had.

Whatever changes the next 50 years bring us, and they will be startling, we

(Continued on page 89.)

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Offshore oil

A safer, more economical way to get millions of barrels of oil from ship to shore to you.

America imports one-third of its oil. Even with energy from other sources, U.S. oil imports will increase for some years. Most of that increase will come from the Middle East. Important as that oil is, it may not arrive here nearly as efficiently as it could.

The reason? America is largely inaccessible to the biggest, most economical oil tankers in the world —*supertankers*. This is because at 200,000 tons and up, these ships require much deeper water than is found in almost any U.S. port.

The result is that America must now rely on smaller tankers to supply our energy system. For example, six 70,000-tonners are needed to deliver the same 3 million barrels of oil that a single 400,000-ton supertanker could deliver.

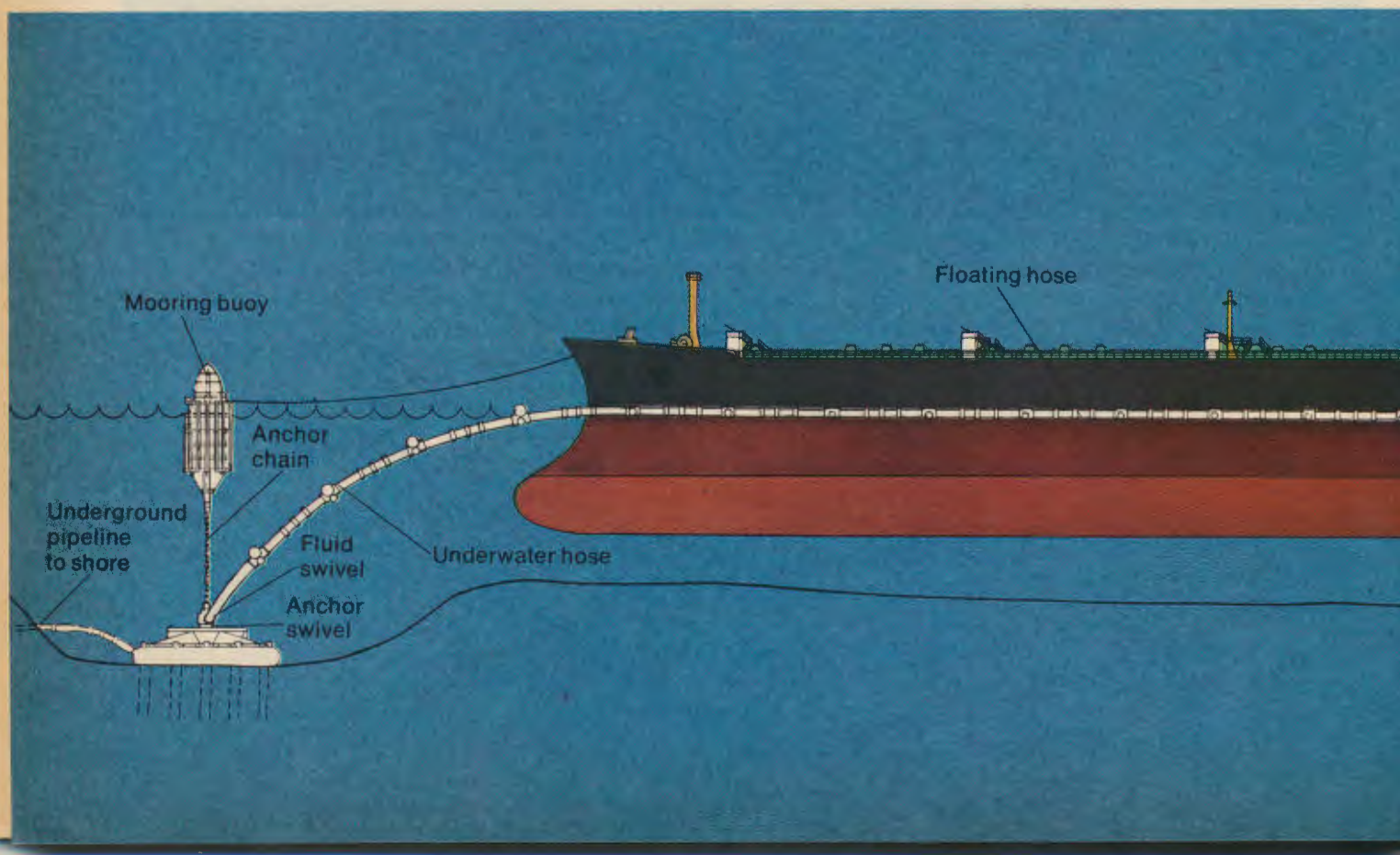
Using fewer but larger ships would reduce harbor congestion, decreasing the chances of collision and spills. Using the big ships also would improve efficiency. For example, moving crude oil from the Middle East to the United States in supertankers would require significantly less fuel than moving the same oil in medium-size tankers.

An offshore answer

One promising solution to the shortage of U.S. deepwater harbors is the single buoy mooring, or SBM. Each SBM is anchored well off shore. It is equipped with a swivel which permits the ships to "weathervane" 360 degrees to face into wind, waves and current. Supertankers simply moor to the SBM, hook up to floating cargo hoses and pump off their oil. The oil is transferred via pipelines buried beneath the sea floor—and beneath the ground on land—to storage tanks.

Compared to in-port unloading, it's fast, simple—and safer. Offshore facilities have been used successfully for years by dozens of countries throughout the world.

Now, Exxon and other compa-



terminals.

nies are engaged in design and other studies for the development of the first deepwater offshore oil terminals for the U.S. Of course, permits will be necessary to allow construction to begin.

A giant step in the Gulf

Several offshore oil terminals have been proposed for the Gulf of Mexico. One of these is "Seadock," a facility planned for installation off the coast of Texas by Exxon and a number of other companies. Plans are to locate "Seadock" 32 miles offshore, southeast of Freeport. Conventional underground pipelines would move crude oil from "Seadock" to refineries along the Gulf Coast and in the Midwest.

Another proposed deepwater terminal called LOOP—Louisiana Offshore Oil Port—would be located 20 miles off the Louisiana coast. It would move crude oil, again via underground pipeline, to refineries in Louisiana, Mississippi and the Midwest.

Both "Seadock" and LOOP would accommodate present-day and future supertankers, unloading their cargos at the rate of several million barrels a day.

Exxon and other companies also are looking into the feasibility of similar offshore oil terminals to serve the Northeast, including New York, New Jersey, Pennsylvania, Maryland and Delaware.

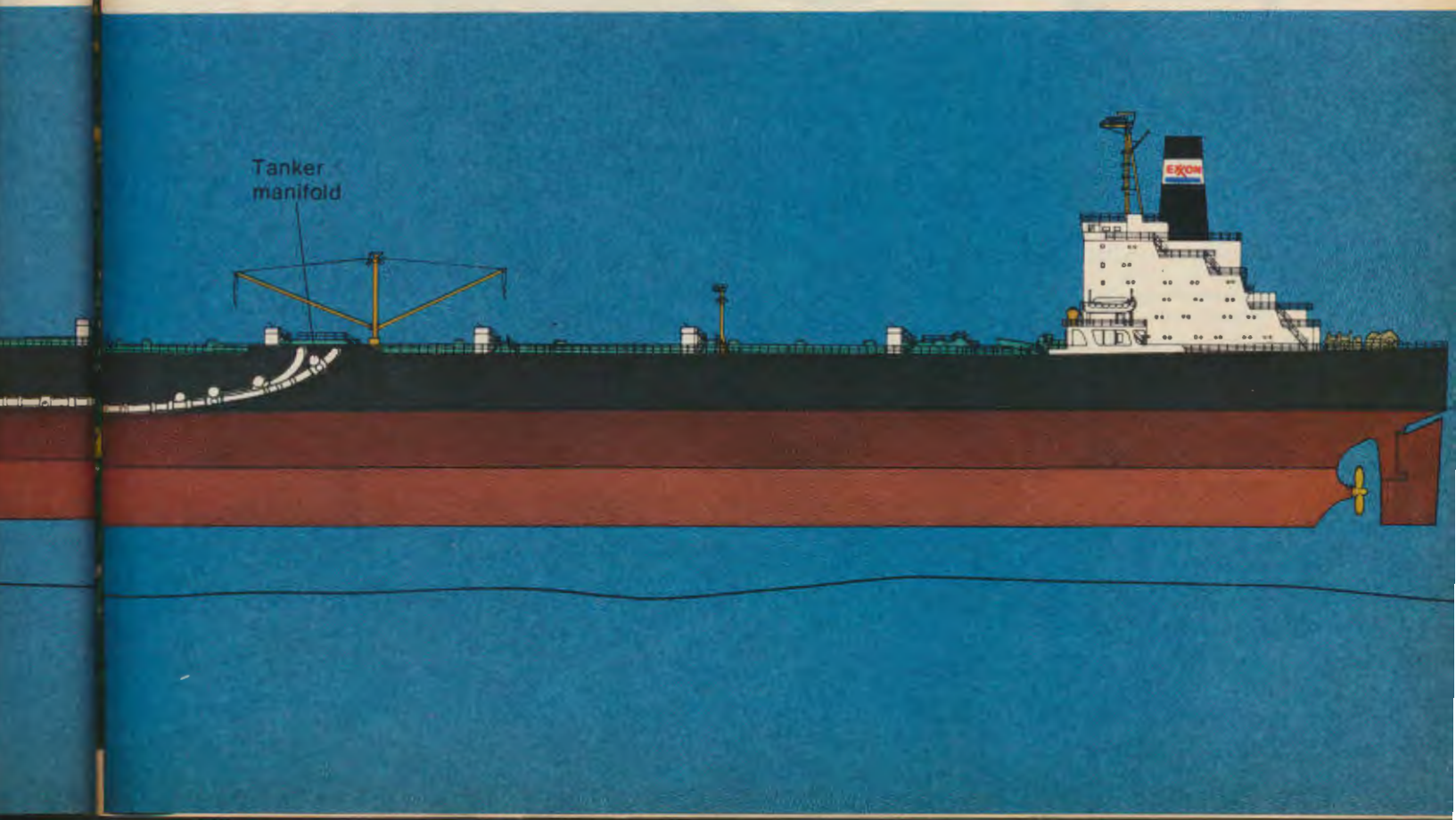
Should states and the cities involved desire it, offshore facilities could provide the opportunity for local industrial expansion.

What about the environment?

Offshore oil terminals greatly reduce the effect of tanker operations on the environment. Noise and visual impact would be cut a good deal because the unloading facility cannot be seen from shore and because fewer tankers would be coming to it. Storage tanks, which are needed no matter how oil is delivered, can be located so as to minimize their visual impact on the landscape. But the drop in harbor congestion would be the greatest environmental benefit because it would substantially reduce the chance of collisions and spills.

If you would like more information on oil tankers and offshore terminals, write for our free booklets, "Safer Tankers and Cleaner Seas" and "Reducing Tanker Accidents," Exxon Corporation, P.O. Box 708, Elmsford, New York 10523.

EXXON



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JOHN DEERE

(**Hesburgh:** *continued from page 84.*)
will still need faith in God, and indeed in His Providence, if this world of ours is not to become a vast insane asylum. We will still need meaning in our lives, a definition that transcends all the change and the instability and uncertainty that always attend change. We will still need a sense of the Kingdom of God, a reign of peace and justice, a significance beyond time and change, an ultimate direction to our everyday prosaic efforts.

THERE STILL WILL BE TIMES of great human crisis when men and women will turn to the good Lord in prayer and supplication. Hopefully, there still will be those who turn to God in adoration of His sublime Reality, the ground of all other reality, those who consciously and unconsciously serve Him in serving the least of His brethren, those who are always in inner peace in the midst of turmoil and crisis because they know He is with them and in them. There will still be those who await His coming with joy.

Is all this weakness? Only in the sense that amid the vast power of the universe, man, the creature, is both weak and strong at the same time, transcending all that changes as he precariously uses his intelligence and freedom to create in human affairs that order which characterizes God's physical creation. This is an endless challenge that grows more dangerous as we discover more power latent in the creation around us.

It is good to remind ourselves on occasion, looking ahead as we are doing right now, that this is the human condition that God intended for us and for our universe. As we develop in our humanity, we also develop in our likeness to Him. The stakes are ever higher as we become more capable of manipulating power and creation. We can make a much better or a much worse world, and we will do the one or the other in the days and years ahead. The choice may be frightening, but it is also exhilarating and exciting—and godlike, too.

The greatest danger is confusing godlikeness with being our own god. We are still accountable to Someone greater. He, not we, is the Beginning and the End, the Alpha and the Omega. He, not we, is the goal of our efforts, the Maker of the rules of life, the destination of our lives and our help along the pilgrim way.

As the problems mount with the coming of great human change and progress, men and women are pulled in two conflicting ways: to think that they can do everything and anything by themselves or to begin to worry that they can only destroy their world and themselves. The latter temptation to pessimism, or Manichaeism in the theological sense, seems to overtake many who comment on the human condition today, what with wars, energy, food, and population crises, shrinking resources, and growing needs. I would submit that the next 50 years will call for a greater sense of God and His ultimate design for us and our world if we are to escape this growing pessimism.

A sense of God makes one optimistic but not unduly so. God's Word to us is simple and sublime: we can make it, not only now, but eternally, if we follow His plan. The plan itself is a road map for human salvation in this world and in the next. It is mindful of our need for direction and meaning. It is natural and divine in the sense that we can do many things of ourselves but much more with divine grace. It recognizes the inherent evil that has dogged humanity from the beginning, but it looks to the final victory of the good. As a worried soldier said during World War II, "Courage is fear that has said its prayers." This reminds us of the words of Our Lord to His followers the night before He died, "Do not let your hearts be troubled and do not be afraid. I have overcome the world." If we are to do likewise, it will not be by denying God's existence, but by welcoming Him in our world, in our lives, in our presence, which is ultimately His. □

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OPEN MIND

discusses

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Participants include
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Produced by WPIX, New York, in cooperation with Saturday Review/World, and moderated by

Richard D. Heffner,

Professor of Communications and Public Policy at Rutgers University, author of "A Documentary History of the United States"; and editor of Tocqueville's "Democracy in America"

In New York, Sun., Sept. 1st
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The Literary Light as Eternal Flame

by Norman Podhoretz

The first question to consider in thinking about the future of literature is whether literature has any future at all. Fifty years ago T. S. Eliot said that the novel was dead, but he did not say that literature was dead; he said that a particular form of narrative art which had developed in response to the needs and purposes of a particular age would "no longer serve" and that another form would therefore inevitably be taking its place. Similarly, when in the 1930s Edmund Wilson declared that verse was a "dying technique," he did not mean that poetry was disappearing; indeed, he explicitly argued that poetry would go on being written, but in modalities other than verse. Today, however, we hear it said on all sides that literature itself—not a particular form or genre but the entire "medium" of structured verbal discourse—is finished, obsolete, through. Print, we are told, will be unable to survive the competition of television and of the technological marvels already being prepared for the "delivery" of entertainment and information. Some day soon we will all be equipped with machines which at the flick of a switch can serve up any film, lecture, or encyclopedia entry we may choose. In this technological context, books will become as obsolete as hand-lettered parchment scrolls, and print will be confined to a bare minimum of strictly utilitarian functions.

The eyes of those who accept this vision of the future perceive its outlines already taking shape not merely on the drawing boards of the engineers but in the minds and hearts of the young. This new generation, though the best-educated of all generations the world has ever seen (or so those who have reared and educated it modestly persist in claiming), cares less about books than about films, less about reason than about feeling, less about words than about images, less about high culture than about low. In this, it is alleged, they are already "tuned in" to a future in which literature will simply cease to exist.

What are we to make of these prophecies? Are they true? The possibility cannot be dismissed out of hand. Certainly the technology on which they depend is there, or is on the point of being developed—though doubts can still be entertained as to whether it will ever be economically feasible to wire every household into the central systems of distribution.

In the meantime, while print is supposed to be growing obsolete, more books than ever before are being published and sold and (presumably) read. Far from declining, the publishing business is booming, with paperbacks especially now rolling off the presses in unprecedented numbers and being distributed through every conceivable outlet. Not so many years ago, books were hard to find in the United States; today they are hard to escape. There is no town so small nor hamlet so remote that it does not offer an astonishing number and variety of books for sale at relatively reasonable prices. In what sense such a situation can be interpreted as a portent of the obsolescence of print baffles the mind.

But what of the youth? Certainly books are the last thing one associates with those hordes of young people who flooded the landscape of the 1960s and dominated its consciousness. One heard that they did occasionally read: Hesse and Vonnegut, Brown and Marcuse, the *I Ching* and the *Kama Sutra*. But one also gathered that these favored exceptions were valued precisely to the degree that they were literary assaults on literature, subverters as it were from within, celebrators in discourse of the non-discursive, apostles of the non-verbal spreading their gospel in words. In any case, it was agreed by all who spoke for the young, who relentlessly told us what "they were trying to tell us," that books were not their "thing."

One wonders, however, how representative these highly publicized young people who either belonged to or fellow-traveled along with the counterculture were of their own generation, let alone of the generations to come. The media said they were *the* young, and everyone believed the media, and yet in 1972 Richard Nixon—Richard Nixon!—carried 50 percent of the youth vote against George McGovern, who had been expected by all the spokesmen to carry the whole generation. Evidently at least half of that generation did not identify itself in any way with the Woodstock Nation or the counterculture. And if they did not stand for their own generation, neither did the young of the counterculture represent the wave of the future. We are less than halfway through the 1970s, and already the counterculture has faded from the scene. It has left its mark and its legacies, most vividly in the area of sexual mores, but almost everything about it now seems as dated as yesterday's slang—than which nothing ever dates so sadly. More and more the counterculture looks like the product of a unique moment in history which is unlikely to recur rather than the beginning of a new era in the development of the human species. The "mutants" of the Sixties have been succeeded in the colleges not by more extreme versions of themselves but by yet another new generation which is once again "hitting the books" that should by now have been moldering beneath another inch or two of dust.

The idea that literature has no future, then, need not be taken very seriously. What does need to be taken seriously, however, is the fact that this idea has achieved so widespread an acceptance. For those who predict the death of literature are not announcing a development over which they have no control; they are hoping to bring about what they pretend merely to foresee. Some of these "prophets" would wish to see literature

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Norman Podhoretz, editor of Commentary *and a longtime literary critic, is the author of* Making It *and* Doings and Undoings: The Fifties and After in American Writing.

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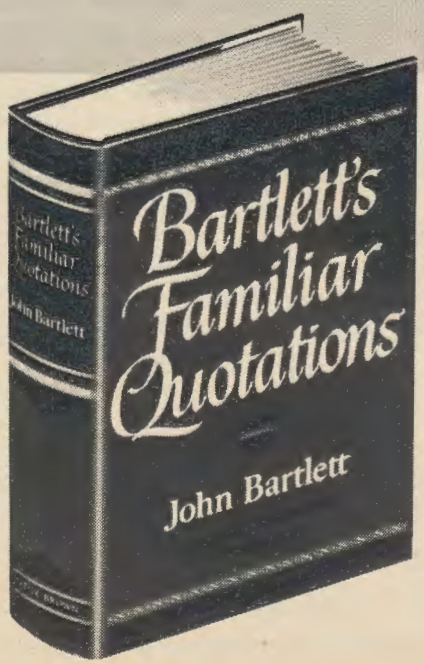

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die because books are in their view a major instrument of human enslavement. Thus Norman O. Brown: "We are in bondage to authority outside ourselves: most obviously . . . in bondage to the authority of books. . . . This bondage to books compels us not to see with our own eyes; compels us to see with the eyes of the dead, with dead eyes. . . . There is a hex on us, the specters in books, the authority of the past; and to exorcise those ghosts is the great work of magical self-liberation." But not only do books serve to perpetuate our enslavement to the authority of the past, they also reinforce our subjugation to the tyranny of mind, of reason, of logic, and all this too must be exorcised if the spirit is ever to be free. All the books, says Brown (meaning it, I suspect, more than metaphorically), must be burned: "In the fire of the holy madness even books lose their gravity, and let themselves go up into the flame."

Norman O. Brown sees books as an obstacle to revolution of the most far-reaching kind—a revolution against the human condition itself—but others would like to see literature die on more narrowly political grounds. "Good writing is counter-revolutionary," said a radical feminist toward the end of the 1960s, and her sentiments were echoed by a professor of literature who denounced the subject he teaches for blunting our outrage at the *status quo* and for encouraging us to make our peace with things as they are. Of course great works of literature—the novels of Dickens, for example—have often had the opposite effect; they have provoked the outrage of their readers and stimulated a demand for social or political reform (just as, despite Norman O. Brown, books have often *helped* people to see with their own eyes). Nevertheless there is no denying that literature—and in fact art in general and especially the greatest art—is most often anti-political in its influence, a dampener of activist ardors, a chastener of utopian greeds.

T. S. Eliot once put the matter with his characteristic sharpness: "In criticism you are responsible only for what you want, [but] in creation you are responsible for what you can do with material which you must simply accept." This "material" which the artist "must simply accept," and which he teaches us to accept—to accept and not to struggle against—is life as the artist knows it in his own time and place. (No wonder then that Lenin, who loved music, also

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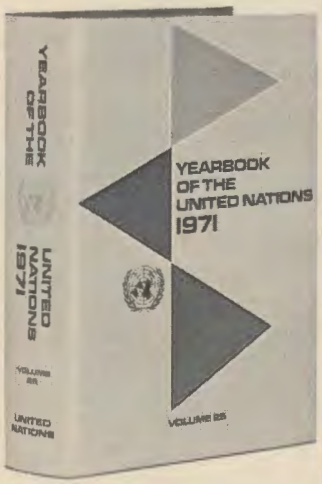

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kept himself on a meager diet of it.) But the material in question, says Eliot, includes "the emotions and feelings of the writer himself," which are also "simply material which he must accept—not virtues to be enlarged or vices to be diminished." (No wonder then that radicals who seek as earnestly to transform themselves as to transform society have generally been hostile to literature.)

IT IS, IN SHORT, because we have been living in an age of radical activism that predictions of the death of literature have been so widely propagated and so readily accepted; and so far as the future is concerned, we can be sure that whenever the activist temper flares up again, literature will be held in suspicion and disesteem. But for many people the idea that literature is finished has also seemed plausible for reasons having more to do with the history of culture than with the history of politics. To put the point as plainly as possible, such people find themselves bored by almost everything that passes for literature today. Of course some people have always been bored by literature, and boredom in any event usually says more about the person bored than about the thing he is bored by. But it is another matter when *literary* people find themselves bored by literature, when people who have devoted their lives to studying and teaching and even writing literature, people for whom literature had always been a passion and even a lust, can hardly bring themselves to read a new novel, let alone a new volume of verse. The poets read, or at least review, each other, but does anyone else read new poetry anymore? As for fiction, which has been the dominant literary mode in our culture for about a century now, it still has a relatively large audience, but it too has begun to bore many who were once in love with it. Nearly 20 years ago, Leslie Fiedler, a famous and brilliant critic, opened an article in a leading literary magazine with the admission that the sight of a group of new novels aroused in him "a desperate desire to sneak out to a movie. How respectable the form has become, how predictable!" In its day this was a shocking statement, an offense to the regnant pieties of the literary world, but by now such sentiments have themselves become respectable and predictable. Susan Sontag, another famous critic, also admitted to being bored by the new novels she was reading, but, unwilling out of some ata-

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vistic loyalty to pronounce literature dead on that account, she developed an ingenious theory according to which boredom became a new form of interested response. And then there was Richard Poirier, a teacher of literature, an editor, and a much-published critic who could say of a recent modernist novel which he himself had praised as a work of genius that "if I hadn't promised to review it I might not have finished it at all."

What precisely was it that had gone wrong? What had become boring about literature? For Poirier, who bravely admitted to boredom with many established classics of the past, nothing essential had changed, but in the case of critics like Fiedler and Sontag, whose main interest has been the modernist movement, with its emphasis on formal experimentation, the problem was that "the tradition of the new," as Harold Rosenberg called it, had worn itself out—becoming, so to speak, more traditional than new. And indeed nothing seems more quaintly old-fashioned today, more rearguard, than the self-styled avant-garde. When Pound and Eliot and Joyce and the other founding fathers of literary modernism undertook to "make it new," the point of their formal experiments was to break through literary conventions grown stale into a new apprehension of reality and to find a new way of bringing order to the special chaos of modern life. But for a long time now, the literary conventions standing in the way of a fresh and newly ordered perception of the world have been those of the modernist movement itself, which have become as stylized and academic—and boring—as the conventions against which it once declared a war of independence.

MODERNISM MEANT FORMAL experimentation, but it also meant a certain attitude toward the modern world. Whether (like Pound and Eliot) their politics were of the Right, or whether (like Aragon and the early Dos Passos) their politics were of the Left, all the writers of the modernist movement were united in their hostility toward "bourgeois society" and what we call today its "middle-class values." They were, in a word, "alienated," and out of the torments of this sense of estrangement—for most of them a new and unsettling experience—they were often able to wrest a detached perspective on a world from which they felt, and very often actually

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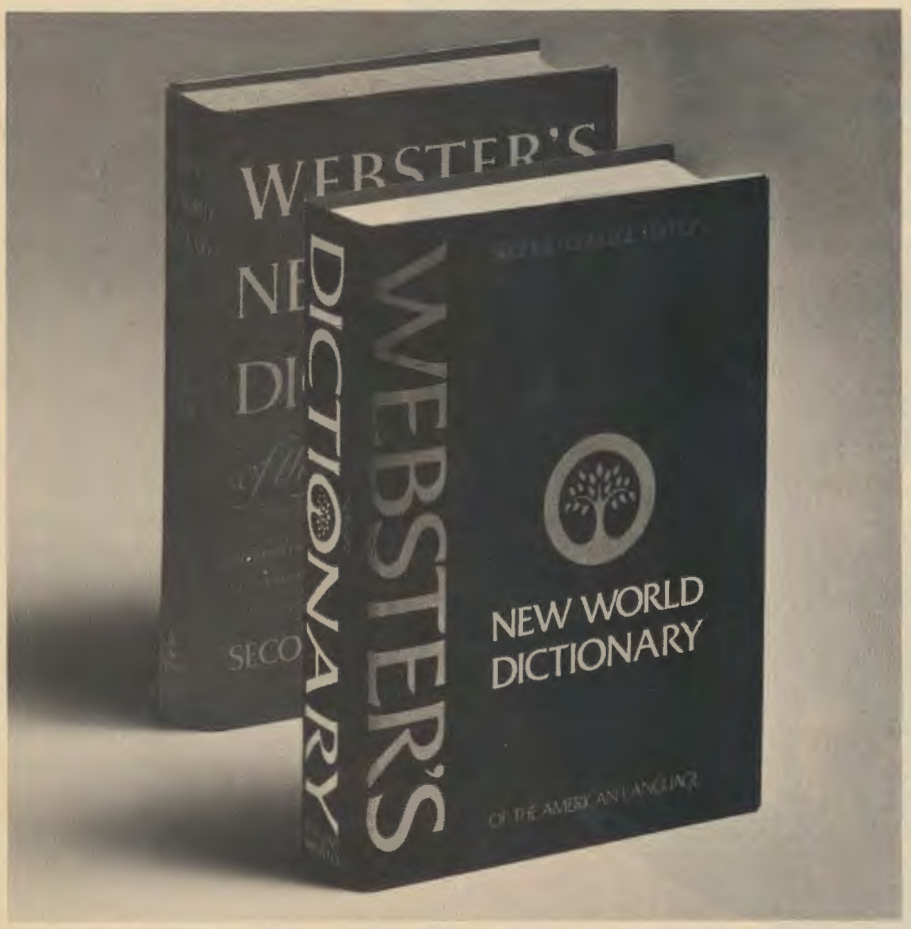

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were, excluded. As the decades went on, however, the anti-bourgeois attitudes associated with modernism increasingly became the commonplace pieties of the literary world (and by the mid-Sixties, of the educated middle class as a whole), growing in the process as respectable and predictable as the literary conventions through which they were endlessly and tiresomely repeated. There were moments when it seemed impossible to find a new novel which did not celebrate the superiority of its author to the world from which he had miraculously sprung, and whose only point in describing that world was to expose it as even shallower and less interesting than he could confidently expect his audience already to think. This may have been good for radical politics, but it was bad for modernist writing.

Nor has the exhaustion of modernism been accompanied in literature by a revitalization of realism. Around the same time that Leslie Fiedler was complaining about the decline of the avant-garde in fiction, Lionel Trilling was registering another kind of complaint having to do, not with matters of form, but with questions of substance. Literature, said Trilling, had "voluntarily surrendered" what had previously been one of its "most characteristic functions, the investigation and criticism of morals and manners." I myself subsequently lamented the degree to which the novel had given up its old effort to bring us "news" of worlds with which we were unfamiliar; and more recently Tom Wolfe offered a similar but even more aggressive indictment: "By the Sixties, about the time I came to New York, the . . . novelists had abandoned the richest terrain of the novel: namely, society, the social tableau, manners and morals, the whole business of 'the way we live now,' in Trollope's phrase."

WHAT ALL OF US were lamenting was the demise of the realistic novel, and each of us had a candidate to propose as its successor in the enterprise of investigating and criticizing manners and morals and of bringing news of the way we live now. Trilling, much impressed with David Riesman's *The Lonely Crowd*, nominated sociology. I myself, pointing to the essays of James Baldwin and others, thought that magazine articles and reportage, "of all things," were taking over what the novel had "voluntarily surrendered." And Wolfe, thinking of himself and writers like Gay

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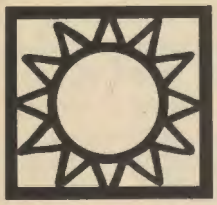

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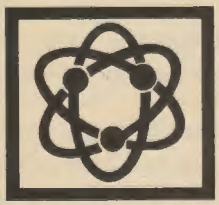

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Coal is vital to steel

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Why restrict our most abundant fuel?

We favor legislation that will make it possible to meet the nation's energy needs and reasonable environmental goals at the same time. More coal is needed now to avert steel shortages. Why cut coal production by unreasonable restrictions on surface mining at a time when all other energy sources—except coal—are in critical supply?

Bethlehem

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In an age of shortages, we have been running a little low on prophets lately. Not of people willing to predict but of people who can foretell. After the deluge of that Old Testament crowd, the prophecy business fell on hard times.

Most forecasting of the future turns out to be a straight-line projection of the present and immediate past. So you will find below no future shocking reading of what lies ahead. I have trouble enough reading fine print.

There are plenty of predictions about the future of print, fine or otherwise. My guess is that despite the debasement, the printed word will flourish. Language will continue to grow and change, if not in elegance, then in suppleness. The young help. I think that "getting your head together," for example, or "spaced out" are evocative, if probably temporary, contributions. I do worry, however, about some adult talk. A commercial for a government agency, heard on FM, tells us about public health "delivery systems," a phrase apparently borrowed from the weapons jargon of the military.

"Print" will probably have to improve graphically, as generations of more visually-sophisticated young people grow to maturity. FOXFIRE I and II happily married words and pictures; so does Israel Shenker's book about authors, WORDS AND THEIR MASTERS, with the Jill Krementz portraits. Ways will have to be found to reverse or slow the upward spiraling of costs. Much "marginal" publishing will fall to costs and apathy.

The face and form of the book change and proliferate. The "hardcover" still represents the center of original publishing and author development. But the paperbound is an original, too, in many cases, even as most are creative reprints.

Through the book and department and chain store, the wholesaler, in the school and library, book club, reprint, and assorted other editions, a good book may have a catlike number of lives.

That forecast which interests a person most is the one that seems to speak of his or her own future. So our one prediction is that because books will be around for a while, so will we.

L. L. Day
Editor-at-Large

The Fine print: Of the authors announced for these special *Saturday Review/World* issues, Doubleday is pleased to have been associated with the works of Isaac Asimov, Jacques-Yves Cousteau, Sinclair Lewis, Louis Kronenberger, Henry Steele Commager, Henry Kissinger.

Among the authors we are pleased to be publishing at the moment are Rose Kennedy and her TIMES TO REMEMBER; Peter Benchley and JAWS; Margaret Craven and I HEARD THE OWL CALL MY NAME, Dan McCall and JACK THE BEAR. In the immediate future we have popular novels scheduled by Arthur Hailey, Irving Stone, Taylor Caldwell, and Leon Uris, as well as John Bartlow Martin's biography of Adlai Stevenson and the memoirs of Earl Warren.

Talese and George Plimpton, put the New Journalism forward as the legitimate heir of the great traditions of realistic fiction.

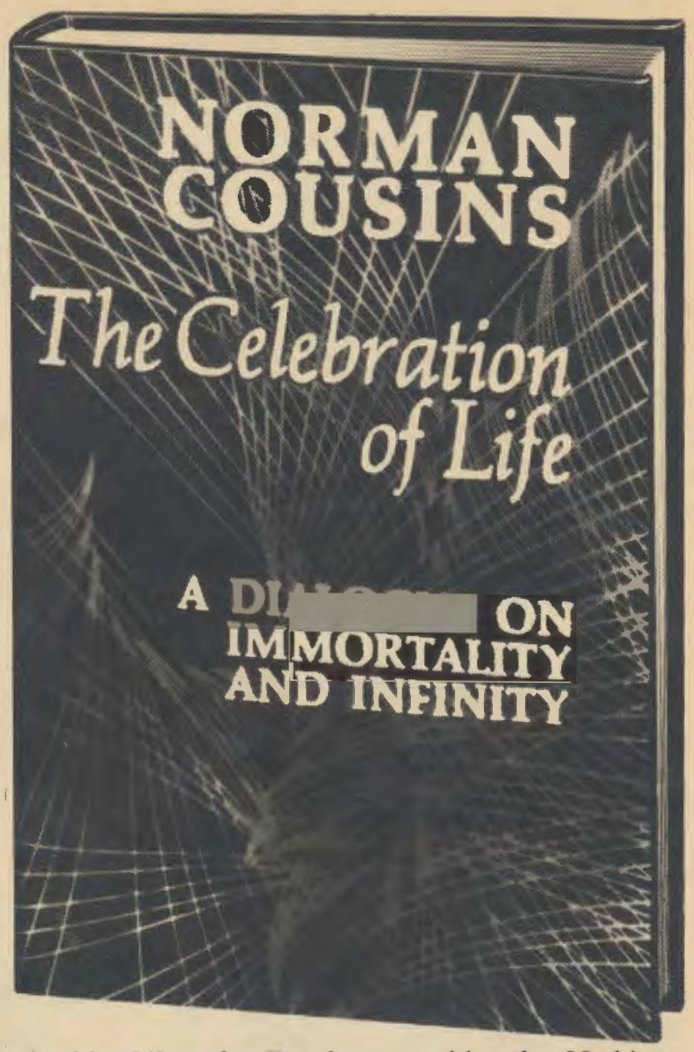
All of us, I now think, were right in our complaint about fiction and wrong in our choice of alternatives. Trilling was wrong about sociology: instead of telling us more and more about the way we live now, the sociologists have been telling us less and less, and much of what they have been telling us we already know. I was wrong about magazine articles: instead of developing in the direction of a deeper and more extensive investigation of the manners and morals of our time, magazines have increasingly engaged in political agitation and moralistic exhortation, with articles degenerating into veiled sermons and editorials. And Wolfe was wrong about journalism: instead of serving in the spirit of Balzac as "secretaries" of American society, the New Journalists (ironically, but perhaps not so surprisingly, following the example of the novelists before them) have become increasingly narcissistic, with every subject or assignment presenting another occasion for the display of their personalities and for the assertion of their superiority to the rest of the world.

THE PAST 50 YEARS, then, have seen the displacement of realism by modernism, the exhaustion in its own turn of the modernist impulse, and a somewhat desperate search for a new form in which the old ambition of literature to record "the way we live now," to set it all down in rich and precise detail, to see the world as in itself it really is, can be renewed and reinvigorated.

In the light of this experience, what can we expect the next 50 years to bring? There is obviously no way of knowing for sure, but my own guess is that imaginative literature will once again offer itself as the means by which the perennially insistent hunger for showing us how we live and what we are like can best be satisfied. I think this will happen because the logic of literary history points toward it. There is no other way for literature to go, except perhaps to the grave, and I do not believe that literature will go to its grave, not only because the case for believing that literature has no future is so weak, but also—and mainly—because it is impossible to imagine a world in which words will cease to delight and stories will cease to be told. □

"There are great truths in this book, and nobody has fetched them out and put them in front as Norman Cousins has done."

-William Ernest Hocking



Here is a beautifully written book that speaks to the individual who rejects the prevailing mood of despair and helplessness but who wants something more than easy answers or homilies. Norman Cousins states the case for hope in our time—not by blinking at the causes of pessimism but by a deep understanding of human capacity and the way that capacity can be fully developed.

Cousins' search for answers takes the form of a provocative Socratic dialogue, a meditation that builds a philosophy of profound optimism on the firm base of human experience, and celebrates the unity, meaning and wonder of life in all its diversity.

This book has been in the making twenty years. William Ernest Hocking, one of the great names in American philosophy this past half-century, had this to say about it:

"Very few philosophers have waded in with such capacity to swim in the Conceptual Vacuum. Hegel tried it in his initial triad, Being—Non-being—Becoming. Bergson threw a bucket-full of scorn on the assumption that it is easier to understand why Nothing should be than why Anything-in-particular should be. And Sartre comes forward with *L'Etre et le Néant*, really a noble bit of analysis in the service of a ramshackle philosophy. But the proposition that Nothingness is impossible, and that there is an ultimate resistance, like a reverse Entropy, in the nature of things —that is fresh and radical thinking and definitely important as such.

"I shouldn't be surprised if this book would give a new jolt to philosophy in this country, and perhaps abroad as well; and poke it out of the semantic ruts in which it idles away the hours of man's most momentous perils and decisions."

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(**Dubos:** *continued from page 10.*)
evolves into a regionalist culture. Poets write about the open road, but few people elect hobo life. Even so-called mobile homes generally stay put.

The unanswered question is, Who settles where? Most people, of course, are compelled to stay where they are by the accidents of life, or to go to a particular place simply because economic opportunities are available. But, increasingly, environmental tastes play a role in the selection of a place for work or for retirement. Some people prefer a relaxing subtropical atmosphere; others, a rugged, stimulating scenery and climate. Some like pastoral scenes; others, a desert or wooded wilderness. Some want the peace of a sleepy village or small town; others, the diversity and excitement of a cosmopolitan metropolis. More importantly, perhaps, many people are eager to find a place that suits them as a stage for action; they are not so much place-seekers as place-makers. Throughout history, place-makers have shaped the distinctive characteristics of landscapes and cityscapes, regardless of natural forces and economic considerations. Land use in France differs from what it is in England, not because of differences in natural history, but because place-makers have imposed on each country a distinctive pattern of man-nature relationships. Similarly, the cityscapes and landscapes of Sweden differ from those of other Scandinavian countries as a consequence of human interventions into nature.

Regionalism in the United States has the special interest that its historical determinants are of recent origin. In any given area the percentage of natives among the residents is likely to be small, but dedication to the spirit of place is commonly the highest among the newcomers. The people most eager to save the Vermont or the Oregon countryside are those who have recently moved into it from other states where the countryside has been spoiled. Choice, rather than birth, makes for local patriotism. On the whole, people who elect to settle in Vermont have tastes and temperaments somewhat different from those who elect to settle in New Hampshire, even though the two states have many natural characteristics in common. And the same can be said for Oregon versus Washington, for Arizona versus Southern California, and even for cozy Connecticut versus New York, the Empire State.

Regionalism used to be the expression of natural forces and historical accidents. But greater geographic and economic mobility has increased the latitude in the selection of a place. It is probable that the greater possibilities for conscious choice of residence will encourage more thoughtful efforts to cultivate the spirit of place and make it come alive in human activities.

EVERY PART OF THE WORLD has some kind of plan for its long-range future. Most prosperous, highly industrialized countries are concerned with environmental quality and question the advisability of further industrialization. In contrast, all poor countries aim at rapid development by the most sophisticated technologies, even at the expense of environmental quality and of their traditions.

The Mandate from Heaven that justified the absolute rule of the ancient Chinese emperors has been reincarnated in Mao Tse-tung's wisdom and will survive in a technocratic form after China has been industrialized. In the communes of present-day rural China or of Shanghai, the nuclear family is as strong and important as it was in imperial China, even though the social contexts in which it operates are now completely different from those of the past. Social changes can hardly be successful unless they achieve a large measure of conformity between the new and the old—in other words, unless the spirit of place survives.

I SHALL USE the current increase in the cost of energy to illustrate how the adaptive responses to a single change differ from one social and technological situation to another.

First, I must point out that modern agriculture requires enormous amounts of energy—for the construction and operation of tractors, trucks, and other equipment; for the production of fertilizers and pesticides; for drainage, irrigation, and so forth. The modern farmer spends more "industrial calories" than he recovers from the land in the form of food calories. Because modern agriculture can thus be regarded as a technique for the conversion of fossil fuels into foods (and also into textiles), it is inevitable that the cost of agricultural products will go up everywhere with the cost of fuels, but the social effects will be qualitatively different depending upon the levels of industrialization.

In the poor countries, which are not yet industrialized, agricultural yields are

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Home Address | Street | City | State | ZIP Code

Years at Present Address | Own Home ☐ Rent ☐ | Telephone (include area code) | Number of Dependent Children | Social Security Number

Previous Home Address | Street | City | State | ZIP Code | Years there

3. Firm Name or Employer | Nature of Business | Position

Address | Street | City | State | ZIP Code

Telephone (Include Area Code) | Years with firm | Annual Earnings $ | NOTE: If less than $10,000, indicate am't and source of other income, and name and address of banker, broker or att'y who can confirm this.

Amount and Source of other income

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tional magnitude; they will favor the trend to internationalism and uniformity. Others will be in the form of much smaller plants—probably of an entirely different nature and suited to local uses and to soft technologies. The ideal of village life, which has persisted since neolithic times, will be incorporated in, but not absorbed by, the anonymous life of the world community. Communes for ordinary citizens—even for commuters—might help people in 2024 to recapture a sense of self-sufficiency, community life, and contact with nature.

CHANGE THERE MUST BE, because it is an essential condition of life. But change can be successful only if it occurs within the constraints imposed by the ecological characteristics of each locality and by the unchangeable demands of human nature. The human species acquired its genetic constitution some 100,000 years ago, and there is no chance that it can be significantly and safely altered. However, granted the biological and psychological stability of our species, the immense diversity of its attributes enables human beings to express many trends in their individual lives and in their societies. Human beings can be selfish or altruistic, careless or fastidious, home-loving or eager to take to the open road. As already mentioned, their civilizations move simultaneously toward international uniformity and toward regional differences. This fundamental diversity makes human behavior pleasantly unpredictable and accounts for the fact that the future is hardly ever an extrapolation of the past or present.

Our very notion of progress also reflects conflicting tendencies. The ancient myth of eternal return is counterbalanced by the belief that everything is forever changing toward some omega point. The Bible teaches that there is nothing new under the sun but also that we must build the New Jerusalem.

Experience shows that human affairs exhibit recurring cycles, just as do the seasons, the movements of the celestial bodies, and all other natural phenomena. In this light, the human condition at any given time is but one stage in the endless ebb and flow of events. The myth of eternal return has great appeal, because it provides the satisfaction of experiencing diversity while being part of eternity. On the other hand, Western civilization is committed to a dynamic view of life that implies continuous change—a belief in the possibility of progress, which is as ancient as the Greek myth of Prometheus. Most people now take it for granted that modern civilization is engaged in a continuous process of change to a new state that will certainly be different from anything in the past, even though it may not be better.

During the past two decades, our attitude concerning progress has itself begun to change. We realize that the new is not necessarily preferable to the old and, especially, that our own type of civilization is not superior to others—even those we consider primitive—when the quality of life is used as the criterion of comparison, instead of technological power. We also feel that a tangible link to the past is an essential component of happiness; one of our painful experiences is finding that to go home is bearable only for a short visit, because so little is left to which we can relate. We long for a kind of social order that will give us, as did the myth of the eternal return, not only the excitement of change but also the security of returning to a state and place in which we feel at home.

Whether we look forward to material progress or long for the good old days, there is no doubt, in any case, that the world has changed greatly since the beginning of the Industrial Revolution and that it will continue to change. I rejoice in most of the changes because I believe that we cannot be fully human without seeking new experiences—the adventures of the spirit as well as of the flesh. But I also believe that the transformations of the physical world have been, and will be, less significant than commonly assumed—the reason being that the most important manifestations of human life have characteristics that are unchangeable and universal. Homer, Shakespeare, Racine, will remain meaningful to us simply because the passions they portray will remain the passions that move the world.

The permanent aspects of our constitution are thus at least as relevant to the future as are diversity and change. The world of 2024 will be interesting and creative to the extent that it will provide opportunities for the expression of the opposite, complementary urges embodied in the biological and psychological nature of the human species. Bob Dylan states an eternal truth when he sings, "The times they are a-changin'." But he should add to his message that it is the same human nature and the same physical nature that are being eternally recycled during the change. □

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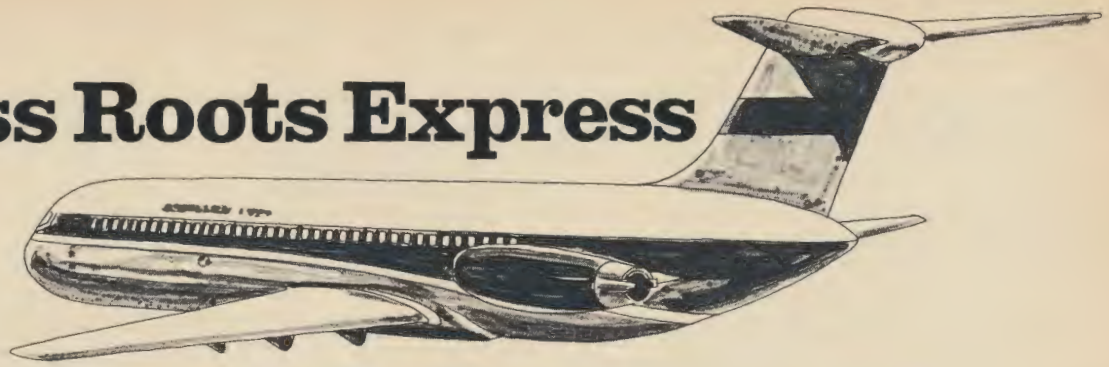

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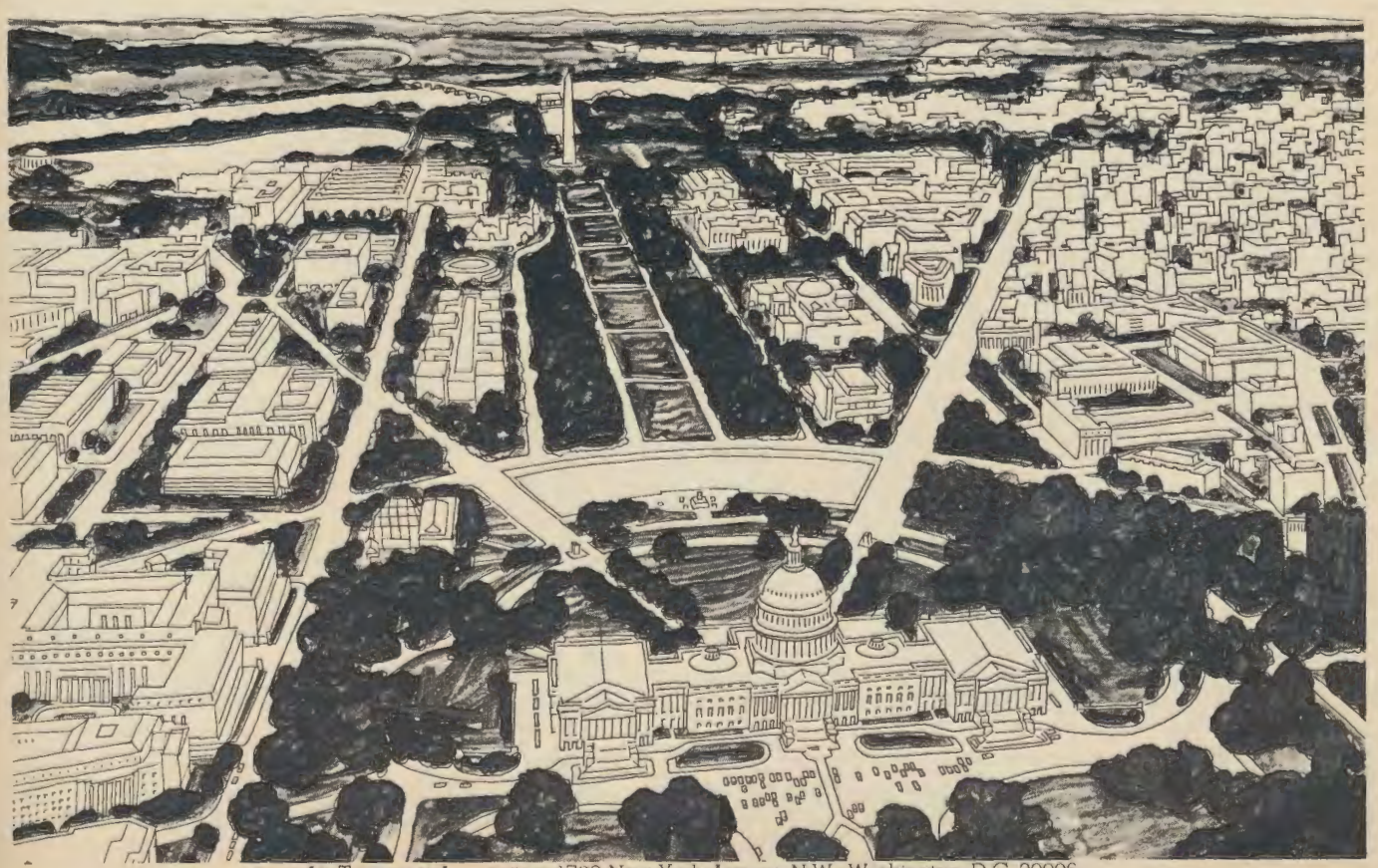

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(**Sakharov:** *continued from page 14.*)
PT there will be a widely developed system of subterranean cities for sleep and entertainment, with service stations for underground transportation and mining.

I foresee the industrialization, mechanization, and intensification of agriculture (particularly in the WT) not only through the classic use of fertilizers but also with the gradual creation of an artificial superfertile soil, with universal irrigation, and, in the northern areas, with a widespread system of hothouses, artificially illuminated, with heated soil, that use electrophori and perhaps other physical methods to induce growth.

Of course, genetics and selection will continue to play a prime role. Thus, the "green revolution" of the last few decades will continue and develop. New forms of agriculture will arise, including marine, bacterial, microalgal, and fungal. The surface of the oceans, of Antarctica, and, ultimately, of the moon and the planets as well, will be gradually adapted for agricultural use.

A PRESSING PROBLEM today is protein starvation, afflicting hundreds of millions of people. This form of malnutrition cannot be solved by expanding animal husbandry because even now animal feed makes up almost 50 percent of the world's agricultural production. Besides, many other factors, including the preservation of the environment, demand a reduction of animal husbandry. I assume that in the next few decades a huge industry will be created to produce animal-protein substitutes—in particular, artificial amino acids, primarily through the enrichment of vegetable matter. This will lead to a sharp curtailment of animal husbandry.

Changes almost as radical as these should take place in industry, energy production, and general life-styles. The most important task in preserving the environment will be the global changeover to closed cycles, with the complete absence of dangerous and polluting emissions. The gigantic technological and economic problems that accompany such a changeover can be resolved only on an international scale (as can the problems of restructuring agricultural production, demographic problems, and so on).

Another aspect of industry and of the future in general will be the more widespread use of cybernetic technology.

I foresee that the parallel development of semiconductor, magnetic, electrovacuum, photo-electronic, laser, cryotron, gas-dynamic, and other forms of cybernetics will lead to an enormous growth of its potential economic and technological possibilities.

"I foresee a universal information system which will give everyone access at any given moment to the contents of any book that has ever been published. . . ."

A unique role will be played by progress in communications and information.

One of the first stages of this progress will be the creation of a single global telephone and videophone system. Far in the future, more than 50 years from now, I foresee a universal information system (UIS), which will give everyone access at any given moment to the contents of any book that has ever been published or any magazine or any fact. The UIS will have individual miniature-computer terminals, central-control points for the flood of information, and communication channels incorporating thousands of artificial communications from satellites, cables, and laser lines.

Even the partial realization of the UIS will profoundly affect every person, his leisure activities, and his intellectual and artistic development. Unlike television, the major source of information for many of our contemporaries, the UIS will give each person maximum freedom of choice and will require individual activity.

BUT THE TRUE historic role of the UIS will be to break down the barriers to the exchange of information among countries and people. The complete accessibility of information, particularly in the creation of art, carries the danger of reducing its value. But I am certain that this contradiction will somehow be resolved. Art and its perception are always so individual that the value of personal contact with the work and the artist will always remain. Books will also retain their value. The private library will always exist, because it represents personal, individual choice and beauty and tradition, in the good sense of the word. Personal contact with art and books will always remain a joy.

As far as energy is concerned: I am certain that during the next 50 years the importance of energy created from coal at huge power plants with pollution controls will become even greater. Simultaneously, to be sure, the production of atomic energy will become widespread, and by the end of that period, so will energy created through fusion. The problem of "burying" radioactive wastes from atomic energy is now merely an economic one, and in the future it will be no more complex or expensive than the equally important extraction of sulfurous gas and nitrogen oxide from the furnace gases of steam-power plants.

In the matter of transportation: for family and individual transportation to be employed primarily in the PT, the automobile will be replaced, in my opinion, by a battery-powered vehicle on mechanical "legs" that will not disturb the grass cover or require asphalt roads. Basic freight and passenger transport will be carried out in atomic-powered helium dirigibles and, primarily, in high-speed, atomic-powered trains that will run on monorails and underground. In many cases, particularly in urban transportation, passengers and freight will be loaded and unloaded from moving vehicles with the aid of "intermediate" facilities (like the moving sidewalks in H. G. Wells's novel *When the Sleeper Wakes* or like unloading cars on parallel tracks).

As far as science, the latest technology, and space exploration are concerned: in scientific research, the use of theoretical computer simulation of many complex processes will take on even greater significance. Computers with larger memories and faster action (real-time computers or perhaps photoelectric computers or purely optical ones in which informational fields are visually displayed) will provide the opportunity to solve multi-faceted problems, problems with multiple variables, and quantum-mechanical and statistical problems of many kinds. Examples of such problems include weather forecasting; the magnetic-gas dynamics of the sun, the solar corona, and other astrophysical objects; the analysis of organic molecules and elementary biophysical processes; the determination of properties of solid and liquid bodies, liquid crystals, and elementary particles; cosmological calculations; the plotting of multi-faceted production processes (for example, in metal-

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lurgy and the chemical industry); and complex economic and sociological calculations. Even though computer simulation should under no circumstances replace experiment and observation, it provides awesome auxiliary possibilities for the development of science. Simulation can control the accuracy of the theoretical explanation of some phenomena.

It is possible that there will be achievements in the synthesis of matter that is super-conductive at room temperature. Such a discovery would be revolutionary in electronics and in many other areas of technology—for example, in transportation, creating super-conductive rails, on which the vehicle glides without friction on a magnetic "cushion"; of course, the vehicle's runners could be super-conductors and the rails magnetized.

I imagine that the achievements in physics and chemistry (perhaps employing computer modeling) will lead not only to the creation of synthetics superior to the natural materials in every significant way (the first steps have been taken in this field) but also to the artificial reproduction of many unique aspects of entire systems existing in nature. I imagine that automatons of the future will have efficient and easily directed "muscles" of contractive polymers and that there will be highly sensitive analyzers of organic and inorganic mixtures of the air and water operating on the principle of an artificial "nose." Artificial diamonds will be created from graphite through special underground atomic blasts. Diamonds, of course, play a major role in contemporary technology, and cheaper production methods will heighten their importance.

Space exploration will be even more significant. I foresee greater attempts to establish communication with civilizations from other planets. This will involve the search for interplanetary signals on all known wavelengths and the simultaneous planning and establishment of our own transmitting stations. It would also entail searching outer space for the stations of extraterrestrial civilizations. Of course, information obtained "out there" could have a revolutionary impact on all aspects of human life—in science and technology, naturally—and also could result in an exchange of social experience.

I predict that powerful telescopes set up at space laboratories or on the moon will permit us to see the planets orbiting the nearest stars (Alpha Centauri and others). Atmospheric obstacles make it impossible to enlarge the existing mirrors of the telescopes on earth.

In 50 years the economic exploitation of the surface of the moon and the asteroids will probably be underway. Atomic blasts on the asteroids may direct them "closer" to the earth.

"There is no possibility of 'turning back' some aspects of progress without destroying all of civilization."

I HAVE SET FORTH a few of my predictions about the future of science and technology. But I have almost completely overlooked the very heart of science, which often turns out to be the most important in terms of practical consequences—the highly abstract theoretical research that is born of the indefatigable curiosity, flexibility, and power of human reason. In the first half of the twentieth century, such research led to the creation of a specific and a general theory of relativity, the creation of quantum mechanics, and the discovery of the structure of the atom and its nucleus.

Discoveries on that scale have always been, and always will be, unpredictable. I can only hazard a guess, and with great reservations, about the general directions in which comparable discoveries will take place.

Research in the theory of elementary particles and in cosmology may lead not only to major concrete advances in existing areas of research but also to the formation of completely new perceptions of the structure of space and time. Great unexpected findings may come from research in physiology and biophysics, in the regulation of vital functions, in medicine, in social cybernetics, and in the general theory of self-regulation. Every major discovery will have a profound influence on the life of mankind.

The continuation and development of the existing tendencies of scientific and technological progress seem inevitable to me. I do not consider the consequences tragic, despite the fact that I am familiar with the warnings of thinkers who hold the opposite view.

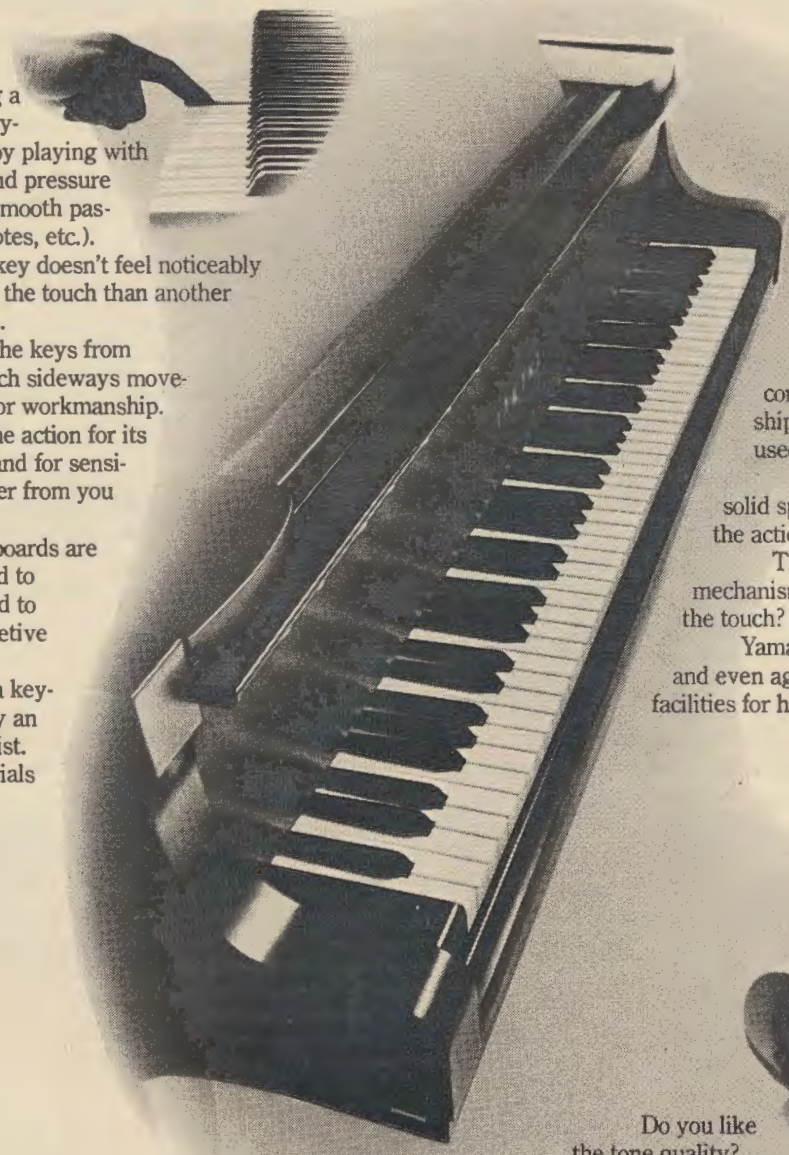
Population growth and the depletion of natural resources make it absolutely impossible for mankind to return to the so-called healthy life of the past (which was, in reality, very difficult and often cruel and joyless), even if man desired it and could bring it about under the conditions of competition and economic and political difficulties. Various sides of scientific and technological progress—urbanization, industrialization, mechanization, automation, the use of fertilizers and chemical weed-killers, the growth of culture and leisure time, medical progress, better nourishment, the lowering of the mortality rate, and the prolonging of life—are closely interconnected, and there is no possibility of "turning back" some aspects of progress without destroying all of civilization. Only the ruin of civilization by the holocaust of a global thermonuclear catastrophe, by famine, epidemics, or general chaos could turn progress around, but only a madman would wish for such an outcome.

THINGS ARE NOT WELL IN THE WORLD today in the most direct and simple sense of the word. Hunger and death threaten the majority of men. That is why the first goal of truly humane progress must be to put an end to those dangers, and any other approach would be unforgiveable snobbism. Yet I am not prone to insist on the technological and material side of progress. I am certain that the "supergoal" of human institutions, and that includes progress, is not only to protect all those born on earth from excessive suffering and early death but also to preserve in mankind all that is human: the joy of spontaneous work with knowing hands and a knowing mind, the joy of mutual help and of good relations with people and nature, and the joy of learning and art. I do not believe the contradictions in these goals to be insurmountable. Even now, the citizens of the more developed, industrialized countries have more opportunities for a normal, healthy life than their contemporaries in the more backward and hungry countries have. And in any case, progress that will save people from hunger and disease cannot contradict the preservation of the source of active good, that which is most humane in man.

I believe that mankind will find a rational solution to the complex problem of realizing the grand, necessary, and inevitable goals of progress without losing the humaneness of humanity and the naturalness of nature. □

Text telephoned by Mr. Sakharov to *SR/W* and translated by Antonina W. Bouis

THREE VITAL KINDS OF CONSISTENCY YOU WILL FIND IN A YAMAHA PIANO.



Begin testing a piano's action (or keyboard mechanism) by playing with a variety of touch and pressure (try loud "attacks," smooth passages, short crisp notes, etc.).

Be sure one key doesn't feel noticeably lighter or heavier to the touch than another (inconsistent action).

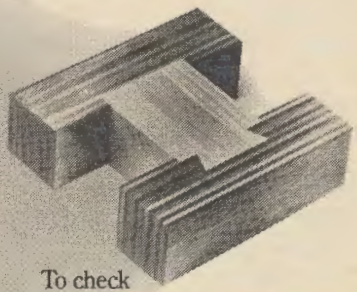
Try moving the keys from side to side. Too much sideways movement is a sign of poor workmanship.

Also check the action for its speed of response, and for sensitive transfer of power from you to the strings.

Yamaha keyboards are precise from one end to another, and respond to the slightest interpretive nuances.

Each Yamaha keyboard is balanced by an experienced specialist.

Choice materials and ultra-precise fitting tolerances are utilized.

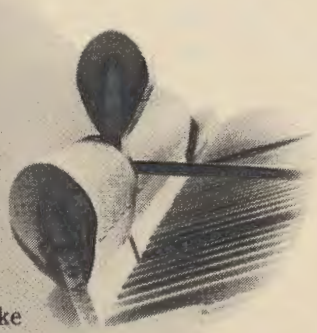


To check consistency and quality of workmanship, first find out if various materials used in the instrument are first rate.

For example, is the sounding board solid spruce? Are fine hardwoods used for the action parts?

Then examine the cabinetry. And mechanisms. Are edges and joints smooth to the touch? Can you see or feel inconsistencies?

Yamaha makes each part of its pianos and even ages the wood in its own advanced facilities for high standards of quality control.



Do you like the tone quality?

However bright or mellow (etc.) you like your piano sound, check to be sure its tone character is consistent, over its full range.

Also, be sure to ask how well the instrument is built to stay in tune.

Yamaha pianos have features like a unique tuning pin block of the finest quarter sawed maple, and a sealing system we call "Humidiseal" for enduring tuning stability.

Consistency of touch, workmanship, and sound are just some of the things to look for in a piano. For a complete booklet on the subject of piano buying, write to Yamaha International Corp., P.O. Box 6600, Buena Park, Calif. 90620.

YAMAHA

"Even the combined 7 million deaths were less than one year's growth in human numbers . . . a pledge to end hunger without population limitation would be empty."

(**Bundy:** *from page 20.*)

The consequences of the Protocols may be the most dramatic of all the changes of the last 50 years. In 1974 the world had about 4 billion people. It was then believed by the experts that with a continuation of the trends then apparent, *including* the best existing efforts of population workers and governments, the population of the globe today would be between 10 and 12 billion and still rising. The census estimate for last year shows a total of less than 7 billion, and for the first time in 300 years the world's population is essentially stable.

The Population Protocols, the Charter of Freedom From Hunger, and the Constitution of the World Nuclear Authority were negotiated concurrently, and it was not a short process; the meetings lasted from early 1985 to late 1988. It was easy to agree that hunger must end—and very hard indeed to devise a workable and agreed-upon process by which, for a long transitional period, the major food-exporting nations would limit their own increasingly varied and meat-based diets in order to build adequate world-food stocks. Probably the task would have been impossible without the extraordinary example set by the exporters of the old British Commonwealth, and it is not clear that Australia would have followed the Canadian lead if there had not been a decisive demonstration, in the Olympic Games of 1988, that with proper dietary supplements vegetarians make the best athletes.

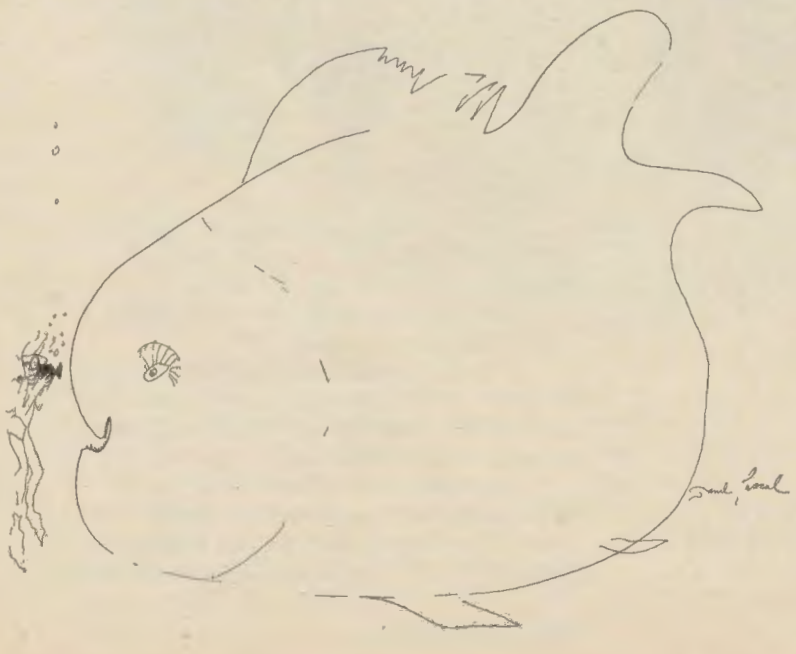
And we must remember, finally, that not everything was done by negotiation. A limited number of small countries did resist to the end the "limitations on sovereignty" required for nuclear safety. The measures taken to secure their agreement have never been fully approved by the fraternity of international lawyers. There is increasingly general acceptance of the doctrine proclaimed unilaterally by the Secretary-General in the year 2000—*salus omnium suprema lex*—but there is little doubt that the "police measures" taken by the Founding Five in 1988 had no such doctrine to defend them at the time. It is better to admit that the Events had created their own necessity.

But in the end the diplomatic complexities, the acts of force, and the simple haggles of the formative years were forgotten in the triumph of 1989. Just as most Americans cannot remember anything between the Battle of Yorktown and the adoption of their Constitution, so the present generation is distressingly ignorant of the processes that led to the Great Covenant. They know its Preamble by heart: "So that mankind may survive. . . ." They know the three Instruments it created as Americans know their own three branches: the Nuclear Control Authority, the Food Commission, and the Population Court. They even know the debatable analogies among these three strong but limited instruments of government and the different branches of the American (and other) governments. But what they truly remember is that the Great Covenant of Survival, signed in New York and in the five founding capitals on October 24, 1989 (United Nations Day), remains in force 35 years later and has gone from strength to strength.

We tend to complacency as we rehearse this history, because we know so well what has been prevented. So we do well to remember that we have paid some price in liberty, at least as it was understood in 1974. The constraints of meeting the standards of the Population Protocols we have already mentioned. They were, and are, the hardest to bear and justify, though the worst was over about ten years ago. The requirements for nuclear safety, while most of them bear only on the people and institutions directly involved in that rapidly growing industry, necessarily include rights of search which the U.S. courts, at least, would have questioned in the mid-twentieth century, and rights of access that were once anathema to China and the Soviet Union.

THE CONSTRAINT ON LIBERTY required by the Food Commission is less direct, and we are used to it, but it would have been surprising to our grandfathers. In effect it has meant that the sowing of crops and the uses of harvests—for export, for chickens, for cattle, or for bread—have been regulated not by national but by international authority, and this regulation has extended into other fields that affect the productivity of the world's land. Fertilizer has a priority, even now, which is a source of jealousy to other claimants on the raw materials it uses and on the energy for its plants. The controls over the world's fishing go far beyond what anyone would have dared to urge at the Conference on the Law of the Sea in 1974. The 200-mile limit did not survive the achievement of unity by the Founding Five.

Yet the constraints of the Food Commission operate more on the power of states and corporations than directly on the personal liberties of citizens. They are mild compared with the constraints required in some cases for population control and milder still compared with the constraint of hunger. What the age o



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"Could those 75 million lives have been saved? It is a question without answer. One can imagine a world which had paid no admission fees for survival."

the Covenant has demonstrated, in a larger view, is not so much that survival requires limitations on liberty, but rather how narrow those limitations really are. Freedom of speech and religion have not had to be surrendered in return for freedom from hunger and freedom from nuclear fear. There is still not much free speech in the Socialist world—but in other countries with other traditions men and women still speak as they please.

To students of politics, indeed, the great lesson of the Covenant is that it is possible to establish worldwide authorities for limited purposes without ending the role of the nation-state. The Covenant has shattered the myth of indivisible sovereignty. The most striking example was the process of population limitation. The Population Court has never had any administrative apparatus beyond that required for the inspection and validation of census figures. The ways and means of executing population policy have been left entirely to nations. The sanctions for non-compliance have rested with the Food Commission. And fortunately the seven cases of limited penalties, while they have caused major difficulties and sharply slowed the rate of caloric improvement in the penalized countries, have fallen far short of the creation of any level of malnutrition remotely comparable to what was routine in the hungry countries even before the Famines.

Yet with all their respect for the surviving nation-states, the three Instruments of the Covenant are not toothless. The Nuclear Authority and the Food Commission are part of the U.N. family, but they work outside its traditional system of governance. They are subject to no veto; their executives report to directors who are themselves not agents of governments; and the weighted voting that elects directors reflects not only the decisive role of the Founding Five of the Eighties but also the economic weight of Europe, Japan, and the Middle Eastern Federation. The Population Court has a similar—if more judicial—strength and stature.

The three Instruments are not perfect. Some smaller states, believing themselves safe from hunger, refused to join the Population Protocols or the Food Commission, accepting the Nuclear Authority only because it was imposed. There are fewer of these holdouts now than there were in 1989, but the insularity of states like Albania and Burma has proven very strong. There are many who believe that accession to the Protocols and the Commission should be compulsory, but so far the weight of opinion has been the other way. Each passing decade strengthens the tradition of support for the words of the Preamble: "To do all that must be done for our survival—and to do nothing more." It is this tradition that has protected all three Instruments, in all participating states, throughout the current time of turbulence.

"Therapy didn't help. I had this neurotic desire to be punished, and Dr. Marcus kept raising his fees, and I loved it."

AN ACCOUNT SO COMPRESSED, of happenings so great, must omit dozens of questions that cry out for comment. But there is one with which I would close, because it is crucial to our present troubles, too. Was it necessary to pay the ghastly price of the Famines and the Events to get the Covenant? What was done in 1989 was little more than what reason and generosity would have ordained at any time in the early Seventies. Could those 75 million lives have been saved? It is a question with no certain answer. One can imagine a world which had paid no such admissions fee for survival, but one can also imagine a much worse history for these last 50 years; measured against a full-scale nuclear holocaust the Events remain small, although it was their very enormity that changed the world. And if the Famines had "luckily" come later, it is probable that they would most unluckily have been far worse. Moreover, a look further back in history suggests that great lessons are not usually cheap. What did it cost the French and Germans, the Japanese and the Americans, the Israelis and the Arabs, to learn to be friends?

But do we now understand underemployment and inflation, even in principle, as well as 50 years ago we understood how to end hunger and nuclear danger? The answer to that question must await the historians of a later time. □

IBM Reports

Four principles of privacy

For some time now, there has been a growing effort in this country to preserve the individual's right to privacy in the face of expanding requirements for information by business, government and other organizations.

In searching for appropriate guidelines, private and governmental groups have explored many avenues and considered many aspects of the privacy question.

As a company with a vital interest in information and information handling, IBM endorses in their basic purpose four principles of privacy which have emerged from various studies, and which appear to be the cornerstones of sound public policy on this sensitive issue.

1. Individuals should have access to information about themselves in record-keeping systems. And there should be some procedure for individuals to find out how this information is being used.

2. There should be some way for an individual to correct or amend an inaccurate record.

3. An individual should be able to prevent information from being improperly disclosed or used for other than authorized purposes without his or her consent, unless required by law.

4. The custodian of data files containing sensitive information should take reasonable precautions to be sure that the data are reliable and not misused.

Translating such broad principles into specific and uniform guidelines will, of course, not be easy. They must be thoughtfully interpreted in terms of the widely varying purposes of information systems generally.

In particular, the proper balance must be found between limiting access to information for the protection of privacy on one hand, and allowing freedom of information to fulfill the needs of society on the other.

But solutions must be found. And they will call for the patient understanding and best efforts of everyone concerned. In this search, IBM pledges its full and whole-hearted cooperation.

IBM

(**World Atlas:** *from page 31.*)
cultural elements that make political division or integration more likely:

(9) Religion. As Israeli-Arab and Indian-Pakistani relations show, religious differences can contribute to political explosions.

(10) Racial and (11) language barriers, together with religion. These will not show much change in the next half-century, and they will continue to form the social substrata of politics.

(12) Political ideology. One important factor is an evaluation of the degree of nationalism.

Further complicating the task of foretelling the shape of future maps is the fact that our notion of the national border is in flux and will probably change considerably in the next 50 years. Because of developments in science, technology, communication, and transportation, the notion of statehood, regarding both East and West, is shifting. Growing economic interdependence, with the increasing exchange of goods, information, and resources, makes the "small world" a truism. Furthermore, the new importance of oceans and seabeds will lead to cooperative efforts on a common territory. Finally, the advent of mass media, especially the television satellite, is expanding the ordinary person's self-concept to include being a citizen of the earth. National sovereignty may pale before the spectacle of one planet.

While many variations exist, there are in general three main kinds of political boundaries. The first may be shown on a map by a thick line representing an *impermeable boundary,* such as those maintained by force of arms between the U.S.S.R. and China, Israel and the Arab nations, East and West Germany, and India and Pakistan. A less tense kind of impermeable boundary exists where the borders are maintained by guards, customs, passports, and visas.

The *permeable political boundary* is a second kind and might be represented as a thin line. The borders of the United States and Canada and of the European Community countries, which require no passport or customs inspections, are two examples.

The third kind of border may be called the *residual boundary*. The borders between states in the United States or the republics in the U.S.S.R. are examples of this. For many political functions, such boundaries have become theoretical fictions.

I will venture that, while all three kinds of boundaries will continue to exist, the next half-century will continue a significant shift toward permeable and residual political boundaries.

It will probably continue to be true that in the next 50 years, the only major changes in boundaries will be the result of armed conflict: revolutions and major wars. The future holds for us the specter of five or more possible large-scale wars in Asia and the Pacific and Indian oceans: (1) a U.S./U.S.S.R. thermonuclear war, (2) a Sino-Soviet war, (3) a Sino-American war, (4) a Sino-Soviet–American war, or (5) a Sino-Indian war. This list of conflicts omits Japan, which, I believe, will continue its critical experiment of being a major economic power without a major military establishment and will not develop nuclear weapons.

FOR THE SAKE OF BREVITY, this discussion is limited to the effects of a hypothetical Sino-Soviet war on Asian boundaries. While both nations are working to prevent such a desolate loss of their people and resources, they realize that the convergence of the wrong historical events could bring it about.

If such a war, rather than ending as a stalemate, were won by the Soviet Union, Manchuria and Tibet might become independent; Taiwan would remain so. The Sinkiang area of western China might possibly become another republic of the Soviet Union, and Mongolia would remain independent but would probably expand to include Inner Mongolia. If such a war were to break out after the turn of the century, China might win instead, an eventuality that would result in her absorbing as buffer zones Mongolia, the Alma-Ata region of Soviet Central Asia as far west as Tashkent, and Siberia from Lake Baikal eastward.

While there may be little historical basis for an optimistic viewpoint, if nuclear deterrence fails, there is little point in discussing the future. However, local wars, including civil wars, fought with conventional weapons, will probably still occur in many areas, such as the Middle East, the Asian subcontinent, Indochina, and Korea. If there are no major wars by 2024, the map of Asia will not have changed a great deal. Some of the likely shifts might be: Korea will probably be reunited, with a residual border between the North and South; Taiwan will probably rejoin China, with a residual border; in Indochina, Vietnam will be reunited, and Laos and the Khmer Republic (Cambodia) will be, for most political purposes, part of Vietnam with a residual or permeable border; Hong Kong (now British) and Macao (now Portuguese) will reunite with China; Timor (now Portuguese) will become part of Indonesia; Malaysia and Singapore will probably unite, with only a residual border; Indonesia may join with Malaysia and Singapore to form a commonwealth-type union; on the island of New Guinea, Papua may acquire independent status; Kashmir may become a state having permeable borders with India, Pakistan, and China; and, finally, there may well be some new residual and even permeable borders within India, Indonesia, and China.

Fifty years ago who would have foreseen Asia's political boundaries as they are today? And I realize the future that I project for 2024 is very like the situation today. I suspect that the period since World War II begins a new political phase —nation-building—which will continue for some time. Political structures that have not taken root in the indigenous cultures, but are merely an unadapted veneer of Westernization, cannot succeed or remain stable. Culturally, Asia is far more heterogeneous than the nations of Europe, and the course of its nation-building must include both redeveloping its own skills of political independence and developing culturally integrated approaches to those factors of power that are important in the twentieth and twenty-first centuries. In general, this process of nation-building from within will affect other kinds of maps (military, economic, et cetera) more than will the territorial expansion of geographic boundaries. □

Professor of international relations at Kyoto Sangyo University, Kei Wakaizumi is presently a fellow at the Woodrow Wilson International Center for Scholars in Washington. His dialogue with Arnold Toynbee became a book, Serving the Future.

ANSWER TO MIDDLETON DOUBLE-CROSTIC NO. 54

MERLE MILLER:
PLAIN SPEAKING

The President . . . said, "Well, of course. The American people always see through a counterfeit. It sometimes takes a little time, but eventually they can always spot one. And MacArthur. . . . If there ever was to be a Counterfeit Club, he would have been president of it."

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So that more of the children and adults who become afflicted each day and need them, can have them.

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The best ideas are the ideas that help people. ITT

If you'd like to help, send your contribution to: National Retinitis Pigmentosa Foundation, 8331 Mindale Circle, Baltimore, Md. 21207.

(**Armstrong:** *from page 34.*)
temperatures but also because of its predominantly methane atmosphere.

However, for the dedicated explorer, this atmosphere is less formidable than might at first be thought. Methane is a colorless gas, and a methane atmosphere might permit the exploration of Titan from an aircraft.

Jet engines could be designed to run on methane, although the manner would be the inverse of those to which we are accustomed. On the earth the atmosphere contains oxygen, which combines with the fuel—gasoline—carried in the aircraft tanks. On Titan the fuel would be ingested from the atmosphere through the engine inlet, and the oxygen would be carried in the aircraft tanks. Indeed, Titan's methane might be used as spacecraft fuel for the return trip to the earth.

Of course, methane is poor for breathing, but we have become accustomed to oxygen masks, space suits, and pressurized cabins, which would certainly suffice. They might not, however, even be necessary. During open-heart and other advanced surgery, patients are kept alive for extended periods with vital organs such as the heart and lungs completely bypassed. If the oxygenator of the heart-lung machine were miniaturized, it could be worn around the waist, surgically attached to the cardiovascular system, replacing both the lung and the necessity for breathing. This sort of device could be useful to skin divers on the earth as well, since the depths to which they can dive are limited by the gas mixtures and pressures necessary in the lung. With the oxygenator, the lung and windpipe would not be used and could be filled with water, eliminating most of the normal difficulties with deep diving.

ALTHOUGH MANY WOULD BE very reluctant to submit to the surgical procedures necessary to enjoy this sport, explorers of the great planets, Jupiter and Saturn, very well might comply. The giant planets—Jupiter, Saturn, Uranus, and Neptune—are in a class of their own, not only because of their size (Jupiter has a diameter ten times that of Earth, Saturn nine, Uranus and Neptune four) but also because of their densities (low, about equal to water) and their tremendously deep and stormy atmospheres of methane, hydrogen, and ammonia. Unmanned probes will have penetrated those turbulent shields and revealed what lies below. Jupiter might have a solid surface, a liquid surface, or perhaps no identifiable surface at all. Assuming a surface does exist, the gravity would be such that a man's weight would be more than double its earth value. Difficult to breathe, difficult to walk, impossible to enjoy, but not difficult to swim. In a cabin filled with liquid, the body buoyancy would offset the burdensome weight, and the crew, equipped with their oxygenators and fluid-filled lungs, would move as freely as scuba divers on the earth at a depth of 15 feet.

Such hypotheses seem to be merely fantasies. The high gravities also mean that extremely large energy expenditures are required to travel from the surface up to a Jovian orbit. But such fantasies are only one scientific breakthrough away from the possible, certainly not too much to dare in 50 years.

Who will the explorers and colonists be? What flag will they carry? They may be expeditions under American, Russian, or other national ensign, expeditions under a U.N. (or similar organization) banner, or expeditions under the auspices of an international consortium of space-faring nations.

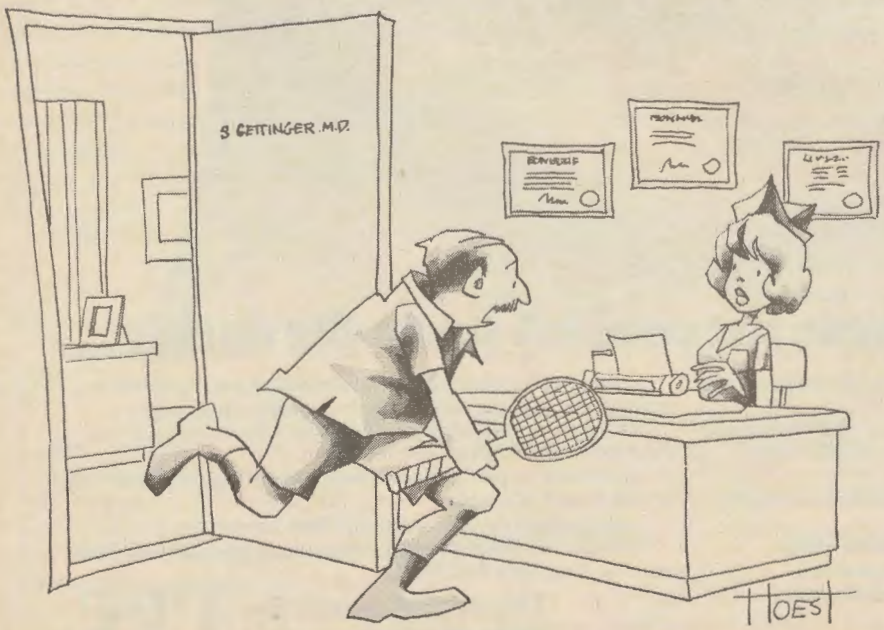
History whispers that the initiation of such expeditions may be 20 percent dependent on noble goals and technical ability and 80 percent dependent on who pays the freight. The lunar colonies will have few difficulties in this respect, as they can be expected to show promise of running in the black. Exploratory flights to the remote parts of the solar system, however, will repay their backers with little more than new knowledge and the satisfaction of achievement. Fortunately, nations and individuals committed to such non-monetary rewards seem always to appear, and the climb up the path of progress is permitted to continue.

Once a colony or expedition exists, however, the importance of its day-to-day problems far outweighs considerations related to national and international problems back home on the earth. The tremendous difficulties of meeting and adjusting to the challenges of strange lands and hostile environments will weld the participants into a team where they can do no less than their very best for their fellows, and will bind their loyalties above all else to the survival of their group.

There will be differences, as predictable as the inevitable squabbling of political factions in any government, but the adversities of nature will be far more important than the adversities of individuals. Those who survive will have developed new strengths. After thousands of years of surrender to the human weaknesses of avarice, prejudice, and greed, man will find ways of improving himself.

Perhaps it won't matter, in the end, which country is the sower of the seed of exploration. The importance will be in the growth of the new plant of progress and in the fruits it will bear. These fruits will be a new breed of the human species, a human with new views, new vigor, new resiliency, and a new view of the human purpose.

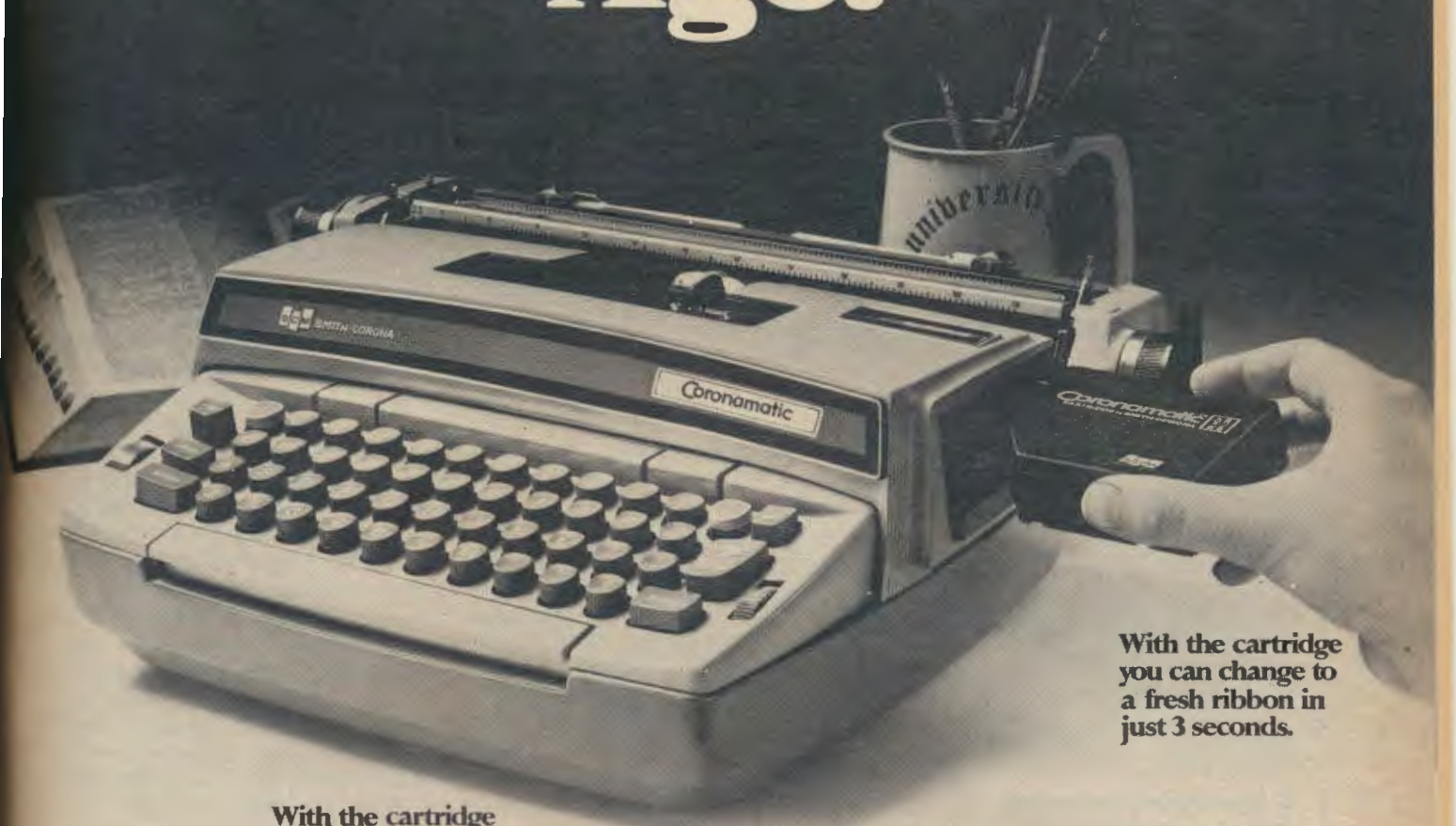
The plant: the tree of human destiny. □



"It's an emergency—Doctors Norman, Carpenter, and Porter need a fourth."

Smith-Corona ushers typewriters into

The Cartridge Age.



With the cartridge you can change to a fresh ribbon in just 3 seconds.

With the cartridge you can change to a color ribbon in just 3 seconds.

With the cartridge you can change to a correction ribbon in just 3 seconds.

The most significant advance in typewriters since the electrics came along has come along. Smith-Corona Electric Portable Cartridge Ribbon Typewriters.

If you had one right now, you could change from one typewriter ribbon to another faster than you could read this sentence.

In 3 seconds you could change from a worn ribbon to a fresh ribbon.

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If you've been thinking about a new typewriter as a back-to-school gift, or for yourself, or for anyone... see what we've been talking about. Ask a Smith-Corona dealer for a demonstration of our unique Cartridge Ribbon Typewriter.

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World's

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■ **FOR BLACK-AND-WHITE:** An unusual cruise for two aboard the *Royal Viking Sea*, departing from New Orleans for Mexico, Central America, and the Caribbean islands.

Plus

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Write for contest rules to SR/World Travel Photography Contest, 488 Madison Avenue, New York, N.Y. 10022.

Deadline for entries is October 1, 1974.

(von Braun: *from page 36.)*
the seemingly unavoidable controls for protecting our environment, or for preserving our non-renewable resources, will inescapably lead us more and more into a world resembling Orwell's *1984*, with Big Brother watching our every move. I do not think it needs to be quite that bad. Man has accomplished some pretty remarkable things on a global basis without putting us in a straitjacket. Take the control of epidemics. In the Middle Ages, the bubonic plague depopulated vast areas. Even a few decades ago, typhoid, yellow fever, malaria, and diphtheria were still major hazards to foreign travel. The international medical community, in close cooperation with governments, has quietly managed to establish a worldwide health-control system that checks the spread of epidemics very effectively while it causes a minimum of inconvenience to international travelers. Those who fail to get the proper inoculation may wind up in quarantine quarters for a few days. A similar fate may befall our future tanker captain who cleans his bilge at midnight.

The upshot: some more commonsense restraint on the part of everybody will be necessary if our planet is to remain a suitable habitat for *Homo sapiens*. But Orwell's *1984* in 2024? No.

In the communications field, satellites will bring about another revolution. After the Intelsat communications satellites of the Sixties and Seventies have established a global telephone network interconnecting nearly one hundred nations, satellites will take over a major share of domestic communications as well. In addition to telephone conversations, they can carry television programs and facsimile service and provide direct ties between computers in different locations in support of such operations as banking or ticket reservations. Soon, lasers, operating at visible and infrared wavelengths (where spectrum space is almost unlimited), will make their entry into the communications satellite field. Nuclear lasers in geosynchronous orbits—23,000 miles up—will be the next major breakthrough. They could provide the capability of handling millions of television channels simultaneously and billions of telephone conversations.

Controlled by an orbital switchboard, laser beam connections could be established (and withdrawn after use) that provide direct links between any two points on earth. The abundance of available channels would soon lead to worldwide video-telephone service. And as communications improve, commuting for business purposes would go out of style. It would become more convenient to let electrons, rather than people, do the traveling. Traffic and parking problems have kept people off the streets even for local chores. But the average American household of 2024 will be equipped with an appliance that combines the features of a television set with those of a desk computer and a Xerox machine. In addition to serving as a TV set and a printout device for news, the push-button-controlled console will permit its owner to receive facsimile-radioed letters, review the shelves of a nearby grocery store, order food and dry goods, pay bills, balance books, and provide color-video telephone service to any point on earth.

Zero-gravity manufacturing and processing experiments conducted in 1973 and 1974 in Skylab, our first manned space station, will open up a new industry in space. Ultra-pure vaccines, growth

WIT TWISTER NO. 28
Edited by Arthur Swan

The object of the game is to complete the poem by thinking of one word whose letters, when rearranged, will yield the appropriate word for each series of blanks. Each dash within a blank corresponds to a letter of the word. Answers on page 128.

As timbers, ___ ___ ___ ___, hint that
the town will grow;
As bristly ___ ___ ___ ___ suggest ripe
grain below;
So may this anagram suggest in time
The ___ ___ ___ ___ whose quill set
down this simple rhyme.

A. S.

COMING
SEPTEMBER 7th

The FUTURE of the ARTS

SR/W's writers assay the cultural world of tomorrow in the next issue of
SATURDAY REVIEW/WORLD

of huge crystals for solid-state devices required by the electronics industry, manufacture of metal alloys that could not be created at all under normal gravity conditions (where the heavy components of the melt would sink to the bottom while the light ones rose to the top), will be produced in orbit. By 2024 the value of these orbital products will have risen to several billion dollars per year, a handsome payoff indeed for the costly Skylab experiments.

Coming generations of our global system of meteorological satellites, equipped with greatly improved instruments, will provide the entire world with all the data needed for a reliable two-week weather forecast. This data will be fed into computers on the ground that have stored in memory banks the detailed information that will permit making an extremely elaborate model of the weather.

This system already saves thousands of lives and millions of dollars in property damage every year by timely warning of approaching hurricanes, tornadoes, and tidal waves. As the meteorological system improves, these savings will grow, too. The economic savings to agriculture, construction, transportation, and many other industries now subject to the vagaries of the weather should indeed be enormous.

It is also safe to predict that some degree of weather control will be achieved. Think of the implications of having rainfall occur only at night, or, more important in terms of meeting the world's need for food, of being able to bring rainfall at will to areas now parched and wracked by drought.

Many of the U. S. space operations in 2024 will become possible through the advent of the reusable Space Shuttle, which will see its first use in approximately 1980. The shuttle will not only drastically reduce the cost of space transportation but also will open up space for the non-astronaut. Surely, there will still be astronauts on the flight deck of the advanced Space Shuttle of 2024, but their role can be compared with that of the flight crew in an airliner. The passengers will be astronomers, meteorologists, environmentalists, climatologists, geologists, oil prospectors, and other earth-resources experts. For them space flight will become the old airline routine of "coffee, tea, or milk?"

With the help of the Space Shuttle, the United States will also resume flights to the moon. *Apollo 17*, launched in December 1972, brought to a close a string of fabulously successful expeditionary ventures to our nearest neighbor in space. For all of its great scientific returns, however, the *Apollo* transportation system had the inherent limitations of all great firsts. For exploring the moon thoroughly, longer "staytimes" on the lunar surface and the capability of covering greater distances on the ground are vitally necessary. The shuttle, supported by a breed of equally reusable, non-streamlined vehicles known as "space tugs," can transport substantially larger useful loads to the lunar surface and do this at greatly reduced cost. This breakthrough in lunar logistics will make possible the establishment and support of a permanent research station on the moon, operated on the principles of our older research stations in the Antarctic. Around the year 2000 this station will be the site of a milestone event in human history: the birth of the first lunar baby.

Space Shuttle Making a Round Trip—*"The shuttle will drastically reduce the cost of space transportation . . . open up space for the non-astronaut."*

By 2024 man will also have set foot on the planet Mars. Will he find life? Here again my crystal ball gets clouded. (There would be no fun in science and exploration if everything could be predicted. We can only *speculate* that we might find at least some lower forms of life there.)

MANY OF THE THINGS I have discussed here are already well on their way to fruition. Others may be a bit on the speculative side. All I have really done is enumerate our options and alternatives.

Whether this nation does indeed achieve its goals in space, turning promise to reality, depends in large measure upon the plans we make and the commitments we are willing to accept. All these things can be, and I believe will be, within our grasp if we have the foresight and the will.

I fervently believe that we have. □

(**Waldheim:** *continued from page 64.*)
sion of the General Assembly called on the initiative of the President of Algeria to deal with the problem of raw materials and development, the world community took a new step forward.

I am convinced this was an important turning point—the moment when the world community began in earnest the effort to make interdependence a positive, rather than a negative, force. It marked the beginning of a general recognition that the major problems of our planet can be faced only by collective action.

Although much of the discussion at the special session covered familiar ground, the range and substance of government statements revealed a series of interlocking changes which affect virtually every aspect of the world economy. The starkest fact of all is that a group of the poorest developing states, some with enormous populations, face emergency, if not disaster, *now* as a result of the precipitous changes in the world economy. It was their plight, and its possible consequences for others, that prompted the General Assembly to agree on an urgent program of action, in which the main parts of the U.N. system would be closely involved to bring help to these affected countries. The World Bank has given a figure of $3 billion as the minimum need for this type of assistance for 1974 and $5–6 billion for 1975. The U.N. system will have to make an immense effort in raising and disbursing funds, assessing relative urgency, and monitoring the flow of aid and the changing pattern of desperate need.

There is unquestionably a new sense of changing interests, of uncharted possibilities, of new and terrible risks, and also of new hopes. It is absolutely essential to maintain the momentum of such ideas as these and turn them into present action and future plans. Governments and international organizations, like people, tend to go back to sleep after a nightmare. In the United Nations we have to try to keep the momentum going, and to face changes and challenges as, or preferably *before*, they become acute. This is equally true in the political field, where preventive diplomacy is much more effective than crisis or curative diplomacy, and in the economic and social field, which shapes the politics of tomorrow and where so much could be done today to bring about a future worthy of our great aspirations. □

(**Cousteau:** *continued from page 44.*)
and control exist in such fields as shipbuilding, engineering, and bridge or building construction, but are lacking in fields involving the quality of our life and the future of the coming generations. Whenever such an organization exists, its duty will be to widely publish, through all existing mass media, the results of both independent evaluation and research.

Who is actually responsible for the accelerated deterioration of our water planet? Is it progress itself, as a few druids claim? Is it industry, as could be suggested by the murky effluents that murder our rivers and our seas? Is it publicity when it promotes artificial needs? Is it we, as individuals, through neglect, ignorance, selfishness? None of these accusations could be seriously substantiated. The responsibility lies almost exclusively at the level of government. Progress offers as much good as evil, and it is the *use* of progress that is to be corrected. The only thing industry refuses is to be penalized in a highly competitive world—industrial firms would welcome international regulations, the same for all in all countries, imposing the same water and smoke standards—even drastic ones! Such regulations would finally create a climate of fair competition, and the additional environmental burden would naturally be included in overhead costs. Publicists have openly stated that they would just as happily publicize recycling as they do "throw aways." And the public is rapidly developing a strong desire to make a personal contribution to a better natural and social environment.

Governments alone have the duty to protect us. To manage the future, they must enter long-range planning and drastic measures today. Governments must unite to determine the acceptable levels of discharge for those toxic products that will slowly decompose in the sea; but they must also unite to impose the absolute-zero level in all effluents for the non-degradable poisons, as these would pile up forever in the sea and would eventually become concentrated in the food chain, ending up on our plates.

O.H.A.—Ocean High Authority. It is too early to turn to the United Nations, because it would be unfair to apportion a share of the cost of the big cleanup to the developing countries which have no responsibility yet in today's spoliations. The solution lies in the hands of the 15 to 20 most polluting countries: they should—they must—very soon delegate a fraction of their national sovereignty to a High Authority fully empowered to decide, implement and control the safety measures that will protect us and our heirs. The other countries will join as soon as their industry grows. Such a High Authority is not a utopian concept; it has precedents. For example, in Europe, after the war, the "Six" delegated their sovereignty to the Coal and Steel Authority, which became the nucleus of the European Community. A strong, enthusiastic public opinion is the only force capable of influencing our governments in the creation of such a High Authority.

The riches of the sea must belong to *everybody*, not to *nobody* and not to *anybody*—it is high time to establish a world policy and an international control of the high seas, using such modern devices as monitoring satellites, which could become "space sheriffs." It is only within such a framework that we can consider taking advantage of the incredible marine resources without destroying them forever.

We must all work hard toward this goal; this is the price of our liquid future. □

Traders Replace Explorers

In fact, the sea has never been really managed. She has been, and is still, "raped" daily. In antiquity, thin coastal populations painfully found a meager supply of food in the sea. Later the oceans became a liquid highway and a battlefield. The very first navigators, as early as the fourth, fifth, and tenth centuries B.C., were pure explorers, like Pytheas. A slow evolution toward more profitable voyages was accelerated not only by such pacific inventions as the sextant or the compass but also by deadly tools, the guns. Almost all the islands discovered—the Canaries, Cape Verde, the Seychelles—were set afire. The slave trade was organized. Entire civilizations in North and South America were eliminated. The scars of these erratic so-called exploitations are not yet healed and are only dwarfed by the new wounds inflicted upon the planet by the tragic absence of a world economic strategy. J.C.

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For one good reason.

The future of wood products depends on more scientific and intensified land management.

INTERNATIONAL PAPER COMPANY

(DeBakey: *continued from page 48.)*
rently available clinical instruments, such as pacemakers, will be improved by the ability to alter performance in response to changing physiologic conditions. At present, the sensor and control systems of currently available clinical instruments, such as pacemakers, are limited to relatively simple functions by requirements for size and power. The continuing reduction in size of integrated circuit devices, coupled with expected micropower operation, however, will make implantable digital computers an eventual reality. Rather than being dependent on simple assessment of rate and pressure, a computer-controlled artificial heart, equipped with appropriate transducers, may be programmed to respond to blood chemical changes with or without residual neural input from vagal or baroreceptor sites, the arterial pressure receptor. Long-term implantation will be aided by future developments in bioelectric power sources, which will obviate the need, or reduce the requirement, for battery-power sources.

ULTRASOUND. Recently, another exciting development of great diagnostic potential has received considerable attention—the use of low-energy ultrasound for non-invasive estimation of size, shape, and motion of internal structures of the body. Initially limited to single crystals, which provided only a pencil-thin view of internal structures, newly developed transducers permit simultaneous views along a number of paths. The digital computer will play an important role in managing the high information rates as arrays of ultrasound transducers become more and more complex. It is feasible now, and will become commonplace in the future, to obtain images of the quality of modern roentgenograms through the judicious combination of ultrasonic transducers and digital computers. By using the organizational capabilities of the digital computer, scientists will construct three-dimensional images of the organ to be analyzed, which the clinician can view from various perspectives.

MULTI-PHASIC SCREENING. Large-scale, multi-phasic screening, already in active use in clinical practice, will soon become commonplace, primarily as a result of a national shift of emphasis in medicine to early detection and prevention of disease. Acceleration of the flow of patients through such elaborate screening facilities will require that a digital computer manage and control routine tasks of data-gathering and record entry, as well as automation of many tests. By providing immediate data entry on completion of individual tests of the screening protocol, the computer enables the patient's pathway through the facility to be guided by a few preliminary results. Under these circumstances, the computer will simultaneously collect and analyze data, make a preliminary diagnosis, schedule facilities, guide the patient, and produce a report that the attending physician can use to discuss the diagnosis with the patient and select appropriate treatment for the disorder before the patient leaves the facility.

"The computer will become an extension of the physician's mind, as the scalpel is an extension of the surgeon's hand."

SIMULATED PHYSIOLOGICAL SYSTEMS. As indicated earlier, considerable development in transducers is necessary for further advancement in this field. The physiological systems of the body are complex and interrelated multi-variate control systems. Many electrical, chemical, chromatic, acoustic, and other manifestations within each system reflect that system's operation. Although we have made great strides in understanding a few of these variables, our knowledge of all the complex interrelations between the physiological functions of the various systems remains extremely limited. One application of computers that may assist in the assessment of these interrelations is modeling, or creating a simulation of, physiological systems. Using a background of knowledge, the modeler may manipulate functions of the system so that he can determine their effects on the organism's performance.

MEDICAL DATA BANKS. In the medium-to-large computers, national data banks will be created to fulfill both clinical and research needs. By making available a medical record of a patient who is unable to provide such data to an unfamiliar physician, the computer allows the physician to provide more immediate care, based on better information, to accident victims or others suddenly disabled away from home. These same data banks, or elaborations of them, will also provide the basis for establishing the character or patterns of diseases and the association of these diseases with controllable environmental, personal, and social factors. Maintenance in these data banks of the identity of special-risk patients, such as pacemaker-wearers or persons sensitive to air pollution, enables initiation of warning mechanisms to reduce the risk to these people. In general, as the volume of medical data increases and the pressures for quantitative medicine continue to grow, the computer will become an extension of the physician's mind, just as the scalpel is an extension of the surgeon's hand.

My faith in human virtue and human wisdom reassures me of man's future on earth. His remarkable ingenuity will meet the challenge of finding other sources of nutrition as conventional food resources become taxed. The confusing state of our current knowledge regarding proper diet will be clarified. The problems created by pollution will be conquered by devising new ways of providing energy.

Moral and ethical problems, inevitable accompaniments of advancing scientific knowledge and technology, will be resolved by the pooling of wisdom and judgment of the savants and the man-on-the-street. Despite the speculation and fears that accompany unsettling new scientific knowledge, whether it be organ transplantation, genetic manipulation, or birth control, history has proved that once the public recognizes and understands that such discoveries can be used to the benefit of society, the fears will be replaced by reasoned concern, unemotional discussion, and eventually humanistic resolution. Even if new laws are required for the application of new scientific knowledge, the public will promote such legislation and will even support the reversal of previous legislation that may have become obsolete or injudicious in light of the new knowledge. We have witnessed evolutionary changes in attitudes and mores that few could have anticipated, and we will continue to adapt our mores as circumstances dictate. The innate humanity and morality of the majority of the people will triumph over the peccancy and ignominy of the few. We can, therefore, have faith in the ultimate wisdom of society to cope—intellectually, psychologically, and ethically—with moral and social issues arising from scientific discoveries, even though those decisions may sometimes seem slow in coming. □

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(**City Limits:** *from page 57.*)
these associations serving continental North America were merged. These offshoots of the old rent-a-car firms were amalgamated into a single public monopoly. All citizens above the age of 16 had access to the private-vehicle system. So now let us take one of these vehicles, which is located in the center.

We pick up a four-seater at one of the lower levels of the station-transfer area in the center, and before we know it, we are traveling on an old-fashioned highway. There are some differences: an almost invisible line set into the driving surface and a series of closely spaced poles provide both lighting and a control system that prevents collisions, automatically bringing any disabled vehicle to a stop by a radar-guidance system. We are traveling at approximately 100 miles an hour, passing fields and forests.

After 15 or 20 minutes of travel, we arrive in a populated area. Houses are spread out on the landscape; some of them certainly look strange if we compare them with the 1970 version. We look in vain for brick, wood, or any other such material. The buildings have a molded look about them, and they appear to be made of a smooth synthetic material. But they are spread over the landscape as the old-fashioned houses were, surrounded by trees, swimming pools, and other such amenities. Some are smaller, grouped along the lake, and these appear to be country residences or weekend houses. Others are bigger and obviously are principal residences.

We swing over to the right lane and onto a little private road meandering among the trees, then up a private driveway to a house on the hill. Our host is an old friend, who used to argue that he was against high-density cities; he hasn't changed his attitudes and has chosen to live out here. The view from his terrace on the hill is quite magnificent. In the foreground, almost hidden by the trees and vegetation, are individual houses all on rather large properties. Beyond is an agricultural area, which appears to separate us from the hill-like structures of the multi-level communities along the trunk line. It is a clear day; the closest structure is about 3 miles away, and we can see it plainly. It rises some 40 stories, its terraces stepping down toward the agricultural landscape. Through large apertures we have a glimpse of the neighborhood centers.

The motion of the vehicles in the inclined tubes, and of the fast-moving train passing at the edge of the neighborhood and onward to the next one, and to the one beyond that, can be seen clearly. Much of the area that separates us from the nearby community was suburban sprawl in the 1970s. The low-density sprawl of little houses consuming every bit of agricultural and open space around the cities continued in the 1980s, but late in the decade a number of new large-scale developments, new towns in town, and new towns out of town were started by private developers, mostly supported by massive public grants. This happened in reaction to the piecemeal development that had become totally bankrupt by the late Seventies. As the city centers proved impossible to manage, except for the rare occasion when a large piece of vacant land was available, new developments were started outside the city centers in the Seventies. And so, after 25 years of suburban sprawl, came another 25 years of dispersal of highly concentrated and planned new communities at the periphery of the existing cities. Businesses, too, moved to these new centers, but the interdependence among the new communities continued to demand highly available and rapid means of transportation among them. As a result, in the late 1980s the government decided to create an all-inclusive National Transportation Authority. Its role was to plan, design, and construct group transportation at the regional and subregional scale and to integrate it totally with all other forms of smaller-scale transportation serving individual communities.

The proposal to build regional transportation systems that would be totally integrated resulted in the concept of regional cities. They were defined by the systems themselves, generally stretching across 300 to 400 miles, planned in a linear system. The system permitted travel from any one point to any other in the regional city in less than an hour.

It was also in the late 1980s that the concept of a guaranteed minimum shelter finally came into being. The establishment of higher environmental standards and of legislation that guaranteed these standards to any member of the population created a housing demand unheard of in the past. The artificial slowdown in housing construction that took place in the 1970s and early 1980s kept down environmental and living standards for large segments of the population and resulted in an explosive demand for new construction. As the provision for infrastructure and shelter involved a great public expenditure, regional monopolies were established in the late 1980s and early 1990s to plan and construct new communities. Throughout the 1990s and in the beginning of the twenty-first century, the constraints of existing construction and facilities in the old city centers were such that much of the growth took place in new communities that were natural extensions of the older centers, all linked together by the regional trunk lines. By the late 1990s the Boston-to-Washington corridor was completely serviced by the regional trunk line, and by the first years of the twenty-first century, the San Francisco–Los Angeles coastline system had also been completed. Dozens of new communities, ranging in size from 30,000 to 250,000, were located along these routes.

At the beginning of the first decade of the twenty-first century, the whole form of urban government was transformed into a two-level system of regional city government made up of a federated system of local community associations. The public monopoly established to build

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these new communities also controlled and owned all land space and air rights. The entire process of planning, design, manufacturing, and construction was controlled by these quasi-public monopolies, just as the entire construction and administration of the regional transportation system was handled by another public authority. Each citizen was guaranteed a basic shelter of a high standard and could supplement that minimum shelter by his own means.

It was not until recently, in the second decade of the twenty-first century, after hundreds of new communities had been built along the regional trunk lines, that we turned our attention to rebuilding the old centers of the metropolitan areas in a rational and organized way. Thus, it was only then that large-scale dismantling and the demolition of the old centers of New York, Chicago, Los Angeles, Montreal, and Toronto started to take place as the rebuilding of three-dimensional developments similar to the regional centers began. New York's famous Park Avenue was quite a sight, with the Pan Am and Lever Brothers buildings coming down, floor by floor.

With the emergence of the new planned communities, the presence of low-density suburban sprawl around these communities deprived the new development of open space. It was only in the late 1990s, with the passing of the Public Control Land Act and the directing of substantial public resources to the acquisition of all land, that large-scale clearing of the suburban areas was possible.

At the turn of the century, tens and hundreds of thousands of little suburban houses were demolished, and the land was returned to agricultural use or left as open public space. Only in certain areas at some distance from the regional trunk line was land made available for individual home ownership. This arrangement appears to be meeting the demand. Although some people have chosen to live permanently in these outlying areas, almost everyone has a stake in one of them for recreational use as a second home. The general pattern is that one unit is owned by five or six families, who take turns in using it. But even that plan appears to have decreased in popularity since intercountry travel has become so commonplace and families go on long vacations in foreign countries, made possible by long holiday periods and short weeks.

Sometimes I sit with friends and reminisce about a conference we all attended some 50 years back in which the future of the city was discussed. Remember the planner who described the city that was to come? The totally disintegrated centers, the continuing sprawl at a much-accelerated pace? The industrialization of building that brought about the construction of large, unscaled, and inhuman high-density suburban developments, so commonplace at that time in Eastern Europe and Russia?

The combination of governmental involvement in the construction of housing and other community developments, coupled with the natural constraints of industrial building, would, he said, produce a scaleless, repetitive, standardized, inhuman environment. He suggested that, even if some public transportation were constructed on a regional scale, it would only serve to bring about further dispersal of unrelated, stratified individual communities. How did he put it? "Los Angeles as it is today, times ten in size and scale, with minor improvements in the individual automobile enabling another 50 years of suburban sprawl, and just write off city centers as ghettos for the poor."

"Why would anyone move back to city centers and try to rejuvenate them?" He put it simply: it would be a combination of the worst high-density public construction of Eastern Europe with endless suburbs, punctuated by regional shopping centers and parking lots. Corporate business and industry would be dispersed all over the place, and in the few centers that would undoubtedly persist, anonymous large-scale construction would take place. Offices, he said, would have no windows, and schools would be built as enclosed containers. With continued dispersal, we would have a hard time controlling pollution, and air in all buildings would be both filtered and controlled. Opening windows would become a memory of the past. Little masks would be put over your mouth and nose when you reluctantly left the synthetic indoors for the outdoors. How did he put it? "It is happening in Japan already today." Going out of doors would be an annual occasion, as when you travel to the Rockies to ski or to the beach in the summer.

It is great to sit here now and be able to say, "How wrong he was!" □

Answer to *Wit Twister* (see page 120): sawn, awns, swan.

Double-Crostic No. 55

by Thomas H. Middleton

1 K	2 U	3 W	4 P	5 A	6 R	7 D	8 F	9 I	10 J	11 Q	12 E	13 S		14 B	15 S	16 C
	17 P	18 W	19 H	20 C	21 M	22 I	23 L	24 F	25 S		26 U	27 O		28 L	29 N	30 E
31 D	32 J	33 H	34 C	35 O	36 B	37 U	38 P		39 F	40 C	41 X		42 I	43 F	44 Q	45 N
46 E	47 J	48 A		49 R	50 C	51 F		52 H	53 D	54 M	55 V		56 I	57 A	58 W	
59 W	60 C	61 L	62 K		63 F	64 R	65 X	66 C	67 G	68 H	69 E		70 W	71 J	72 N	73 D
74 V	75 Q	76 L	77 S		78 G	79 M		80 C	81 A	82 U		83 Q	84 X	85 N	86 B	87 E
88 F		89 J	90 U		91 V		92 O	93 T	94 G	95 K	96 Q	97 C	98 X	99 A	100 L	
101 P	102 F	103 Q	104 X	105 R	106 H		107 B	108 H	109 X		110 E	111 D	112 K	113 G	114 F	115 U
116 A		117 C	118 B	119 X		120 T	121 N	122 S	123 A	124 L	125 E	126 Q	127 U	128 X	129 P	130 D
131 W	132 R		133 B	134 I	135 R	136 T	137 P		138 I	139 S	140 C	141 M	142 J	143 X	144 R	145 U
146 E	147 K	148 F	149 P	150 N	151 Q	152 G		153 X	154 V		155 W		156 R	157 B	158 W	
159 V	160 H		161 F	162 E	163 U	164 B	165 J		166 L	167 T		168 O	169 V	170 A	171 J	172 R
	173 O	174 S	175 V		176 P	177 C	178 T	179 M		180 V	181 T	182 O	183 S	184 E	185 Q	186 X
	187 Q	188 E	189 F	190 J	191 T	192 H	193 M		194 C	195 D	196 R	197 I	198 B	199 Q	200 O	

INSTRUCTIONS

If you've never solved one of these puzzles, it will probably look much more difficult than it actually is. If you can answer only a very few of the WORDS correctly, you're on your way to solving the puzzle.

Fill in the numbered blanks of all the WORDS you can guess, and write the letter of each numbered blank in its correspondingly numbered square in the diagram. The letters printed in the upper-right-hand corners of the squares indicate from what WORD a particular square's letter comes.

The diagram, when filled in, should read as a quotation from a published work. The dark squares are the spaces between words. If there is no dark square at the end of a line, a word may carry over to the line below.

The first letter of each WORD, reading down, will spell the name of the author and the title of the work from which the quotation is taken.

You should find yourself seeing words and phrases taking form in the diagram; so you can work back and forth, from WORDS to diagram and from diagram to WORDS, until the diagram is filled in.

CLUES	WORDS
A. Study of the deformation and flow of matter	5 57 81 99 116 123 170 48
B. Lightweight bus with open sides and no center aisle (Brit.; comp.)	86 107 118 133 157 198 14 36 164
C. Something incidental or added for ornament, symmetry, etc.	177 194 20 60 80 140 34 50 66 117 16 40 97
D. Fail to keep or observe; infringe on	53 73 111 130 195 7 31
E. Striking (comp.)	46 69 87 110 125 146 30 162 188 12 184
F. Not receptive to new ideas (comp.)	24 39 63 114 148 161 189 8 43 88 102 51
G. Loony; screwy	67 78 94 113 152
H. Bringing bad fortune (comp.)	108 192 68 160 19 33 52 106
I. Supply with anything to excess	138 197 9 22 42 56 134
J. Garment worn by ascetics and penitents (2 wds.)	165 71 89 142 190 171 10 32 47
K. Last-stand base for the Axis in Africa, World War II	62 95 112 147 1
L. English poet and scholar (1859–1936; "With rue my heart is laden")	166 23 28 61 124 76 100
M. Worn out	141 193 79 179 21 54
N. His passes gained 28,657 yards	121 29 45 72 85 150
O. Offensive, as an odor	173 182 35 92 27 168 200
P. An organism that can live in a wide range of water depths	4 149 17 38 101 129 137 176
Q. Lutein	44 96 75 126 185 11 83 187 103 151 199
R. Child's undergarment buttoned at belt	196 135 105 144 132 156 49 64 6 172
S. Shining	77 139 13 122 15 174 183 25
T. Bring to a successful end; carry through	120 136 181 93 167 178 191
U. Untaught, non-inferential knowledge	163 82 37 2 127 26 145 115 90
V. The act of marking or setting down in writing	55 74 175 91 180 169 159 154
W. Pertaining to the sky; celestial	18 59 3 158 70 58 155 131
X. Conveying disapproval or censure	41 119 143 84 104 65 98 109 186 153 128

Answer to *Double-Crostic No. 54* appears on page 116.

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(**Education:** *continued from page 76.*)
established his reputation by the books he wrote about the research he did, sometimes with the help of little-recognized students; he kept his preeminence by making it difficult for students to succeed. It was even maintained in some quarters that a professor who succeeded in failing or discouraging a great many students was "maintaining standards." All these assumptions and practices are now in a state of challenge and change, which creates numerous problems in the universities that only time and hard work will solve.

The discussion of the federal role in higher education at the White House conference should please you. Your decisive action, soon after you were elected in 2020, in establishing a new Department of Education and Science in the federal government has, by general agreement, gone far toward solving the fiscal and planning problems of both public and private universities. The aspect of the legislation that created the body of Education and Science Advisors to the President and the Joint Committee of the Congress on Education and Science Policy has filled a vacuum in national planning for education and research that has existed since the early Seventies. The National Fellowship program with its accompanying cost-of-education grants of $15,000 per student each year has combined with the five-year advance planning of research support to remove many of the fiscal unknowns confronted by major universities, apparently without invading their freedom as self-governing institutions.

Perhaps more important than any of these changes has been the change in assumptions we make about the need for men and women with advanced degrees. The policies of the federal government, the states, and the universities themselves are undergoing a rapid change. Not long ago, there was a general belief that a person with a Ph.D. or a law degree or a Master of Fine Arts who was not engaged in his university-derived specialty was "underemployed." The costs of this person's advanced education were seen as wasted, and the tendency was to constrain university programs to fit the demand for high-level manpower. While some restraints of this kind still exist, there is a growing assumption that all of us gain when any one of us develops his abilities and interests to their full potential. The butcher with a Ph.D. may seem a far-fetched idea, but it is today more acceptable than it was a few years ago.

What Is Taught and Learned—the Curriculum

For many years Americans believed that the subject matter communicated by textbooks and teachers was what students learned in schools and colleges. In the latter part of the twentieth century, this view was widely challenged. Education researchers convincingly proved that students learn far more from each other and outside the school entirely than they do from teachers and textbooks. In such areas as attitudes toward the law, mental health, sexual behavior, and personal values, there was some fairly convincing evidence that educational institutions had little influence or had produced negative results.

In addition, student interest in the problems of society—such as poverty, racial conflict, environmental issues, and the use of military and police power—led in the latter years of the twentieth century to a major change in school and college curricula. Students themselves played an important part in deciding what would be taught and learned. Much that had been traditionally emphasized

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in the schools and colleges, particularly the study of past human experience, was abandoned, and a new emphasis on current problems and issues was substituted. In this new emphasis the social and behavioral sciences experienced a major expansion since they provided the tools for examining the problems of the day.

Our conference identified among both students and faculty a discontent with education's concern for the present. To some, it seems to be shallow; to others, to be interesting but rootless. There was little inclination to return to reading *Silas Marner* in secondary-school English courses or to studying the arts in a fashion designed to turn students into art historians, but there is clearly a growing view that men and women who know about their past may have more balance and better judgment in contending with the rapid changes of the present. What both educators and students seem to be searching for is the way to merge education's interest in the problems of the day with a perspective that has somehow been lost or forgotten in the last 50 years. Our detailed report will have some specific recommendations on how this might be done.

Final Points

Finally, here are some very brief observations on points that came up at the conference and that, I think, are worthy of your attention:

• SCHOOL FINANCE: The battle within each state to give schoolchildren equality of educational opportunity and at the same time to treat taxpayers fairly has in large part been won. There are different formulations in the several states, but within a given state we no longer have some children whose public education at taxpayers' expense commands three or four times the funds of the education of others. Yet the problem among states still remains: a child whose family happens to live in one state may get an education that costs $1,000 a year, while in another state, his education would command $4,000 a year. Our conference believes that this situation is unfair, and we will recommend remedies for your consideration.

• SCHOOLS IN THE CITIES: We are glad to be able to report a major improvement in the health of American central-city schools. This seemingly insolvable problem of the period 1960–2000 started to correct itself about 20 years ago as American cities entered a new phase. With the rationing of energy use came the development of improved mass transportation and the decline of the motorcar. Concurrently, cities have revived as places in which to live and work. The flight from the suburbs has created new problems in suburban schools but has renewed the interest of middle- and upper-middle-class Americans in city schools. Their children are rapidly joining those of minority groups that dominated the city schools 20 years ago in the creation of a well-financed, well-run, and integrated system of education.

• LEARNING OUTSIDE THE SCHOOLS AND COLLEGES: A major feature of today's education is the general recognition by schools and colleges that much learning takes place outside of educational institutions—at home, on the job, in community groups, in volunteer activities, over television, and in other ways. The growing recognition of this fact by educational institutions is having significant effects on them and on their students, particularly in secondary schools and colleges, but also to some degree in elementary schools. Among those effects are the following:

(1) Considerable savings in the overall costs of education to the public.

(2) Many fewer dropouts from the schools and a general improvement in the attitude and success of students.

(3) Better-planned relationships between work and education so that expensive job training is frequently provided at the work place rather than in the school.

(4) Much-improved relationships between schools and colleges and their communities.

Because of the already proven success with education conducted outside the schools and colleges, we are recommending that you consider awarding tax credits to profit-making businesses that cooperate with the schools in educational endeavors. Our report will spell out this program in detail.

While there are many more points that we will include in our final report, this letter will give you the general tenor of the White House Conference on Education. Although there are problems and disagreements, our overall view is that the schools and colleges of the country have moved out of the doldrums in which they found themselves in the late twentieth century and have a new lease on life, both because of what they are doing and because of the interest and support of American citizens generally. □

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Jeff knows he has RP. He knows he's been going blind since he was born. And he's glad he knows. So he can prepare for the day when he may be without the little sight he has left.

The most tragic part is, we don't know much more about RP than Jeff does. We can't tell him why it happens and we can't stop it from happening. There is no known treatment or cure for RP.

Jeff knows that, too.

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AUSTRALIA—NEW ZEALAND WANT YOU!!! 50,000 jobs! Paid transportation! Latest information and forms. $1.00. Austco, Box 3623-W, Long Beach, Calif. 90803.

EDUCATORS: Openings nationwide. Oxford Associates, Box 225W, Springfield, Va. 22150.

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INTERESTED IN OWNING A FRANCHISE?—business of your own, or full- or part-time money-making opportunities? Find out what's available. Send name for FREE 5-month subscription to Salesman's Opportunity Magazine, Dept. 280, 1460 Hancock Center, Chicago 60611.

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DIRECTOR OF COUNSELLING AGENCY, skilled in Transactional Analysis, seeks new challenge in helping professions, publishing, or advertising. Will relocate. Dr. Dean Niles, 2175A South Tonne, Arlington Heights, Ill. 60008.

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LIVE LIFE as you used to know it, in unspoiled Vermont. Courtesy and consideration, gracious atmosphere, good conversation. Excellent food. Historic Vermont town of Brandon with Village Green, 5 Churches, famed Middlebury College with its arts and sports nearby. Museums, antiquing . . . plenty to keep you active. Fair rates. Brandon House, SR-74, Brandon, Vt. 05733.

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Authentic.

FEATHER BONNET
With white hackle (feather). Coloured hackles are used in the British Army to differentiate between regiments.

"WING" EPAULETS
To protect the shoulders from sword cuts.

SCARLET DOUBLET
Known the world over as the Scottish and British soldier's colour.

GOLD SASH
Always worn over the left shoulder

SPORRAN
Originally a leather wallet, worn suspended from the waistbelt to carry the day's ration. There are no pockets in the kilt.

KILT
Formerly in one piece with the shoulder plaid, but now worn separately. Highland regiments of the British Army wear the kilt.

HOSE TOPS
Gaelic name, *caddis*, meaning striped.

SILVER COLLAR BADGES
The Dewar's Highlander wears the Saltire of St. Andrew, Patron Saint of Scotland.

SHOULDER PIN
In cold weather, or at night, a clansman in the field would unfasten the shoulder pin so that his plaid became a warm cloak or a blanket.

DRUM MAJOR'S BATON
The Scots have marched into battle to the skirl of the pipes, from Bannockburn (1314) to Aden (1967).

METAL "BREASTPLATE"
Worn where belt and sash cross, and carrying the drumsticks symbolic of the role of the Drum Major.

SWORD
with basket hilt. Worn at the belt, it is called in Gaelic the *claith veg*, (claybeg), or small sword, to distinguish it from the *claith mhor* (claymore), or great sword.

PLAID
means a garment, the main garment of early times, which was kilt and blanket-wrap all in one piece. Tartan is the characteristic cloth of Scotland, woven in stripes.

DEWAR'S "WHITE LABEL"

Certain fine whiskies from the hills and glens of Scotland are blended into every drop of Dewar's "White Label."

Before blending, every one of these selected whiskies is rested and matured in its own snug vat.

Then, one by one, they're brought together by the skilled hand of the master blender of Perth.

Dewar's never varies.

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